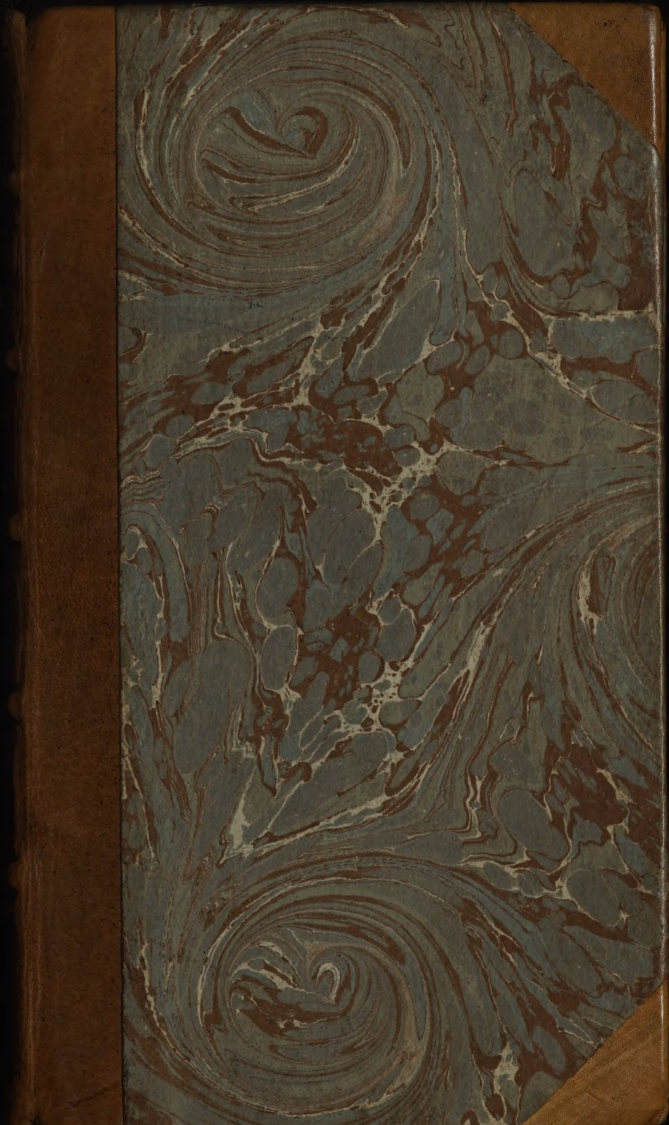

READ
ANATOMY

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The Manuall OF THE ANATOMY OR DISSECTION Of the Body of MAN:

Containing the enumeration and
deſcription of the parts of the ſame;
which uſually are ſhewn in the publick
Anatomicall Exerciſes.

With ſundry Figures thereunto belonging.

The fourth Edition.

By *ALEXANDER* READ,
*Doctor of Phyſick; a fellow of the Phy-
ſitians Colledg of* London; *and a Brother
of the Worſhipfull Company of the*
BARBER-CHIRURGIANS.

LONDON, Printed by *T. Newcomb*, for
Richard Thrale, at the ſign of the
Croſs-Keys, at Pauls-Gate, 1650.

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CAROLO

Magnæ Britanniæ
Monarchæ Hiberniæq;
ac Galliæ Regi potentiſſimo fauſta omnia
precor.

EN offero Majeſtati veſtræ lucubratiunculas iſtas Anatomicas: Munus fateor te minimè dignum, quem Deus ad ſupremum ferè honoris in terris *culmen evexit. Nhilominus ſi omnia juſto trutinæ examine penſentur, quivis æquus arbiter pronuntiabit eas ad te properare debere. Cogitaverat pridem apud ſe Majeſtas veſtra quàm utile, imo neceſſarium huic Reipublicæ ſit multos habere peritos Chirurgos, ſive Pax alma floreat, ſive Bellum ingruat. Quapropter ea ſanxit, ut doctus aliquis ac peritus Medicus communionis hujus fratribus ex ſuggeſtu, ſingulis diebus Martis, huic exercitio deſtinatis, præcepta artis traderet ab auditoribus excipienda, atque Anatomicis diſſectionibus temporibus conſtitutis præeſſet. Quum ea munia mihi obeunda ante aliquot annos commiſſa fuiſſent, animadverti illorum in rebus Anatomicis profectum mirè tardatum, quod nullum haberent compendium Anatomicum, lingua vulgari emiſſum. Ut huic deſiderio occurrerem, compendiolum tale in lu-*

cem emiſi, ex cujus lectione tyrones fructum aliquem percepere. Verum quum proficientibus viſum fuiſſet nimis jejunum, ſumpſi id iterum in manus, ac copioſiùs de humani corporis partibus diſſerui. Quum itaque ſecunda cura refictum in lucem emittendum ſit, ad quem potiùs, quàm ad veſtram Majeſtatem tendet, quæ primæ fœturæ auctrix fuit? Nec eſt quod verear me audaciæ, aut inverecundiæ crimen incurſurum: Quum mihi ſecuritatem promittat eximia veſtra comitas atque affabilitas erga omnes, quæ omnium amorem conciliant, ut dignitas regia timorem. Quæ duo Sceptra Regibus firmant. Vnum hoc Opellæ huic ex hac Dedicatione promittere poſſum: Eam gratiorem omnibus futuram, quod tanti ac talis Regis nomen ſibi præſcripſerit. Scribebam Londini 4. *Calend.* Octob. *Anni* *ab exhibito in carne* Meſſiah, *ſupra milleſimum ſexcenteſimum triceſimi ſeptimi.*

Veſtræ Majeſtatis
cultor humillimus,

ALEXANDER REIDUS
Scoto-Britannus.

To the READER.

Courteous Reader,

N*Ow I preſent to Thee the third Edition of the* Manual of Anatomy, *which ſhall be the laſt that ſhall be publiſhed in my life time, which is not far from its period. The Hour-glaſs haſteneth, and but few ſands remain unrun. The book of the Breſt, and the book of the Brain are altogether new, as the book alſo of the Bones. In this Edition all things are ſet down more fully, Methodically, and Correctly, then in the former. If it give thee contentment, and further thy proceedings, I have obtained that which I aimed at: for I expected no other reward of my labour. I have endeavoured to ſet down all things at-*

temperating my ſelf as plainly and ſhortly as I could, to the capacity of thoſe, who begin to addict their minds to this ſtudy. I am not ſo in love with my own labours, as to think that they can profit ſuch as have made a reaſonable progreſs in it. However, it will ſerve any one in ſtead of an Index, to preſent briefly unto the minde thoſe things which they may finde ſet down at large, in the ample diſcourſes of learned Anatomiſts, as well Ancient as Modern. Make then of it what uſe thou ſhalt think fitteſt, ad wiſh well to the Author, who hath endeavoured to eaſe thee of ſome pains, which thou muſt have taken to have contrived ſuch a compend as this is, of the deſcription of the parts of the body of Man.

Vale.

Fig. 1.

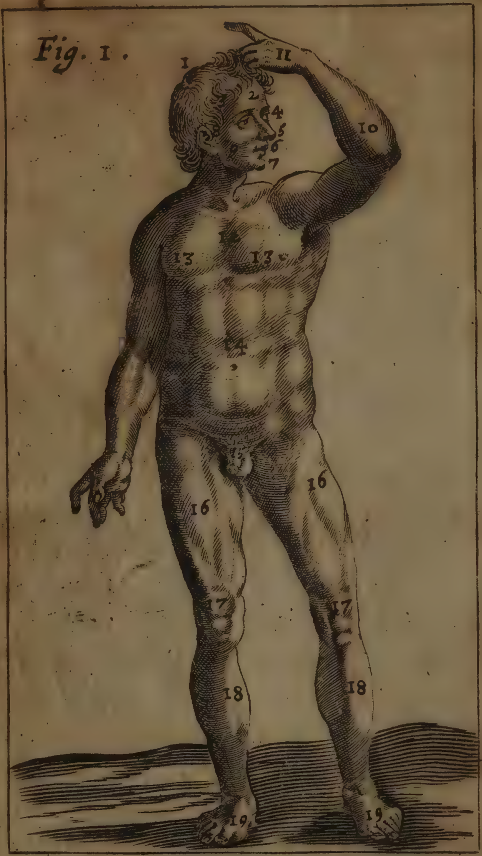
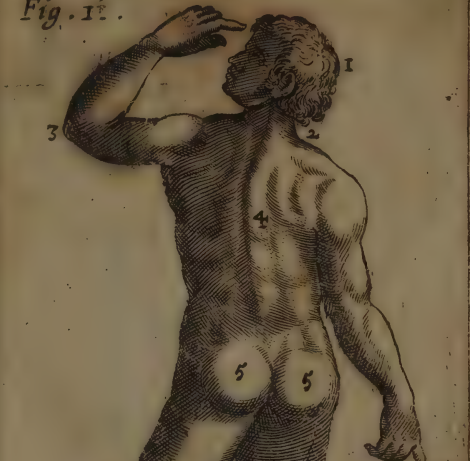


Fig. 1re.



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The explication of the firſt figure.

1 *The hairy Scalp.* 2 *The Forehead.* 3 *The Ear.* 4 *The Eyes.* 5. *The Noſe.* 6 *The Mouth.* 7 *The Chin.* 8 *The Temple.* 9 *The Cheek.* 10 *The Arm.* 11. *The Hand.* 12 *The Breſt.* 13 *The Sides.* 14 *The Belly.* 15 *The Genitals.* 16 *The Thighs.* 17 *The Knees.* 18 *The Legs.* 19 *The Feet.*

The explication of the ſecond figure.

1 *The back part of the Head.* 2 *The Shoulder.* 3 *The Elbow.* 4 *The Back.* 5 *The Buttock.* 6 *The Hams.* 7 *The Calves of the Legs.* 8 *The Ankles.* 9 *The Inſteps.* 10 *The Heel.*

These two figures are to be placed between the Epiſtle to the Reader and the firſt Chapter.

The Number and Contents of the BOOKS.

THe firſt Book containeth the deſcription of the parts of the belly, and hath 27 Chapters.

The ſecond Book containeth the deſcription of the parts of the breaſt, and hath 12 Chapters.

The third Book deſcribeth the head, and hath 26 Chapters.

The fourth ſetteth down the veins, arteries, and ſinews of the limbs, and hath 7 Chapters.

The fifth Book deſcribeth the muſcles of the whole body, and hath 31 Chapters.

The ſixth ſetteth down the bones, and hath 28 Chapters.

THE

THE FIRST BOOK of the lower Cavity, Called ABDOMEN.

Cap. I.

Of the diviſion of the parts of the Body of Man in general.

ANatomy is an artificial ſeparation of the parts of the body by ſection, practiſed to attain to the knowledge of the frame of it, and the uſe of each part. In anatomical exerciſes, firſt the whole carkaſs doth offer it ſelf, then the parts.

The deſcription of Anatomy.

The Regions of the whole

The whole hath four Regions, to wit, the fore and back parts, and the lateral, which are the right and left.

What the whole and a part ſignifie.

I call the whole that which containeth the parts, and a part that, which is contained in the whole, according to the moſt ample acception of the term part; for in a more ſtrict acceptation a part is a body ſolid, cohering with the whole, endued with life, and framed to perform ſome function.

Things required in a part being ſtrictly taken.

1. A part then muſt be ſolid: the humors then cannot be numbred amongſt the parts, becauſe they are fluid.

2. Secondly, it muſt have life: and ſo the extremities of hairs and nails are not to be accounted parts.

3. Thirdly, one part muſt not nouriſh another: and ſo the blood, fat, and ſpirits are not parts.

4 Fourthly, it muſt have a circumſcription.

5. Fifthly, it muſt be united with the whole.

6. Sixthly, it muſt have ſome action and uſe.

The differences of the parts.

The principal differences of parts are taken either from their nature or functions. From their nature, parts are ſaid to be either ſimilary or diſſimilary.

What a ſimilary part is.

A ſimilary part is that whoſe particles are of the ſame ſubſtance and denomination with the whole: as every portion of a bone is a bone. It is otherwiſe called a ſimple part.

The number of ſimple parts.

Of ſimple parts there are ten in number, to wit, The skin, a membrane, the fleſh, a fiber, a vein, an artery, a nerve, a ligament, a cartilage, a bone: they are comprehended in theſe two verſes.

Cartilago, caro, membrana, arteria, nervus,
Vena, ligamentum, cutis, os, lentisſima fibra.

Of a tendon.

To theſe, a tendon, which is the principal part of a muſcle, may be added; for the ſubſtance of it, it is ſimple, without any compoſition.

The differences of ſimple parts.

Of the former ſimple parts,ſome are ſimple indeed, and theſe are in number ſeven; the skin, a membrane, the fleſh, a fibre, a cartilage, a bone. The reſt are onely ſimple to the eye or ſenſe, and not to reaſon; for a nerve (for example) is compoſed of many filaments, covered with a membrane.

What a diſſimilary part is.

A diſſimilary part is that whoſe portions are neither of the ſame ſubſtance, nor the ſame denomination; as a muſcle, in the which are fleſh, a nerve, and a tendon. It is otherwiſe called a compound part, and an organicall part.

Things to be obſerved in an organicall part.

1. In an organicall part foure particles are found; Firſt, the chiefe particle, as the chriſtallin humour in the eye.

2. Secondly, that particle, without the which the action cannot be performed, as the optick nerve.

3. Thirdly, that which furthereth the action, as are the membranes and muſcles.

4. Fourthly, that by the which

the action is preſerved, as the eyelids.

The degrees of an organical part.

Of organicall parts there are foure degrees.

1. The firſt is made onely of the ſimilars, as a muſcle.

2. The ſecond receiveth the firſt kind of organicall parts, and other ſimilaries, as a finger.

3. The third admitteth thoſe of the ſecond degree, as the hand.

4. The fourth is made of the third and other parts, as the arme.

The differences of parts taken from their function.

Parts from their function are ſaid to be either ſuſtaining or ſuſtained. The bones ſuſtaine the frame of the whole body, the reſt are ſuſtained. now theſe are the cavities or the limbs.

CAP. II.

Of the circumſcription, regions, ſubſtance, and parts of the Abdomen.

OF all the parts of the body which are ſubſtained, we are to begin diſſection with the cavities: Firſt becauſe they offer themſelves to the view in the fore region of the body.

Secondly, becauſe they being moiſt, and apt to receive the impreſſion of the externall heat, ſooneſt putrifie, and ſend out noiſome ſmels. The cavities are appointed to receive the principall parts, and thoſe which miniſter unto them. Wherefore there are three cavities, according to the number of the principall parts. The head is for the brain, the breaſt is for the heart, and the belly for the liver. And becauſe this cavity is moſt ſubject to putrefaction,you are to begin at it. Now foure things concerning it offer themſelves. Firſt, the circumſcription,or bounding of it. Secondly, the regions of it. Thirdly, the ſubſtance of it. Fourthly, the ſpeciall parts of it.

As concerning the circumſcription of it, it is ſevered from the breaſt by the midriff. It is bounded above by the *cartilago enſiformis*, and beneath by the ſhare bones.

The regions of it are three, the uppermoſt, middlemoſt, and lowermoſt. The uppermoſt, which is bounded between the *mucronita cartilago*, and three inches above the navell, about the ending of the ſhort ribs, hath three parts: The laterall, which are called *hypochondria*, or *ſubcartilaginea*, becauſe they lie under the cartilages of the ſhort ribs. In the right *hypocondrium* lieth the greateſt part of the liver, but in the left the ſpleen, and greateſt part of the ſtomack. The third part is that which before lieth between the two laterall parts, and is properly called *epigaſtrium*, becauſe the ſtomack lieth under it. In this part remarkable is the pit of the breaſt, which is called καρδία, or *ſcrobiculus cordis*, by the moderne Writers. The middlemoſt part extendeth it ſelfe from three inches above the navel, to three inches under it. The fore part is where the navell is, from whence it is called *regio umbilicalis.* The two laterall parts have no proper denominations. In the right are contained *inteſtinum cæcum*, with part of *Colon*. In the left part of it, a portion of *Iejunum*, and the reſt of *Colon*. The reſt of *Iejunum* is under the navell. The navell in man is wrinkled, as the forehead of an aged woman; but in other creatures it is onely a hard knot without hairs, having no wrinkle. It hath no laterall parts, having no proper names; although *Laurentius lib. 6. Hiſtor. Anatom.* affirmeth it to have, and gives them names; in this region is contained the whole hungry gut.

3. The lower region.

The lower region is called ὑπογάςειον: This region hath three parts, the laterall, and the middlemoſt: The laterall, which reach to the *hypochondria*, are called λαγῶνες, because they are the ſeat of luſt, which is called λαγνεία. By *Hippocrates* they are termed κενεῶνες, becauſe they being placed between the hanch-bones, and ribs, are lank, & ſeem to contain nothing. In Latine they are called *Ilia*, becauſe the *Ilium inteſtinum* lieth under them on every ſide. Beſides this in the right part are placed portions of the *Colon, & cæcum inteſtinum*, which are tyed together. In the left part are contained a great part of the *Colon*, and the *inteſtinum rectum*.

Ilia.

The fore part of the *hypogaſtrium* by *Ariſtot.lib.*1.*Hiſt. animal.*3. is called ἦτρον, which *Gaza* calleth Abdomen and Sumen. Under it lieth the *pubes*, which word ſignifieth both the haires, and the place where the haires grow, which appeare to bud in girles the twelfth yeare, but in boyes the fourteenth yeare, when way is made for the monethly courſes and ſeed, the skin being there made thinner, the heat encreaſing in them. At the ſides of the *pubes* appeare βουβῶνες, or *inguina*, the groines. Under this middle region are contained the bladder, the *inteſtinum rectum*, and the matrix in women.

Inguina.

The hindermoſt parts.

The hindermoſt parts are called *lumbi*, the loines, and they reach from the bending of the back to the buttocks, called *nates*, *ab innitendo*, becauſe when we ſit, we reſt upon them. The fleſhy part on each ſide is called φύα, ἀπὸ τοῦ φαῦσαι, *à palpando*, from culling or clapping. In the right loynes, the right kidney; but in the left, the left kidney is contained.

CAP. III.

Of the common containing parts of the belly.

THe common containing parts of the belly are foure, the skarf-skin, the skin, the fat, and the *membrana carnoſa.*

The skin in man is called *cutis*, but in beaſts *aluta*; in Greek it is called δέρμα, and δέρις; either ἀπὸ τοῦ δέρεσθαι, becauſe it is eaſily flead off; or from τέρμα, ſeing it is the end and ſuperficies of the whole body: Of all the membranes of the body it is the thickeſt.

cuticula.

It hath a double ſubſtance; the one is externall, called ἐπίδερμις ὅτι ἐπὶ τὸ δέρμα τίθεται) becauſe it is placed upon the skin as a cover, but is termed *cuticula* in Latin; for it is as large as the skin, and more compact; for watriſh ſharp humours, paſſing through the skin, are ſtayed by the thickneſs of this, and ſo puſtules are cauſed. In man it is as the peelings of onions. It is without blood, and without feeling.

Three cauſes concurre to the generation of it; to wit, the materiall cauſe is a viſcous and oleous vapour of the blood. The internall efficient cauſe, the naturall heat of the ſubjacent parts raiſing it up. The externall efficient cauſe is the externall coldneſſe, partly of the aire, partly of the skin it ſelf: It is engendered even as the thin skin in milk, and fat brothe; It is hardly ſeparate from the skin with a knife; but eaſily in living creatures by a veſicatory, and in dead perſons by fire, or ſcalding hot water.

Firſt, the uſe of it is to defend the skin, which is of an exquiſite ſenſe, from externall immoderate, either heat or cold. In cold weather it breaketh the cold, that the perſpiration ſhould not be altogether hindered: In hot weather by its compactneſſe it hindereth too great perſpiration.

Secondly, to be a middle between the skin, and the object of feeling.

Thirdly, to ſtay the ichorous ſubſtance from iſſuing from the veines and arteries; for this we ſee when the *cuticula* is rubbed off by any meanes.

2 The true skin is ſix times thicker than the skarfe skin: in children, women, and thoſe which are borne in hot countreyes, it is thinner; but in men, and in thoſe who inhabit cold countreyes, it is thicker.

The Negroes become black, becauſe they having a ſofter skin, and large pores and looſe, many vapours of the aduſt humours, which are raiſed with the ſweat; the groſſer ſubſtance whereof, by reaſon of the exceſſive heat, being dried and burned, cauſed the blackneſſe of the skin; for their infants are not borne black, but reddiſh; and they afterwards become black, the *cuticula* growing in them as in us.

The skin in the forehead and ſides it is thin, thinner yet in the palme of the hand, but thinneſt of all in the lips and cods. In the head, back, and under the heel it is thickeſt. Under the heel the *cuticula* in ſome will be as thick as a barley corne.

The pores will appeare in the skin in the winter time, it being bared; for where they are, the *cuticula* will appeare as a Gooſes skin.

The skin hath an action, to wit, the ſenſe of feeling.

3. Offat

Pinguedo, πιμέλη, *eſt humor oleoſus noſtri corporis à calore moderato ſubjectarum illi partium elevatus, ac inter membranam carnoſam ac*

cutem

Its kinds

cutem concreſcere, quæ partes ſunt denſiores ac frigidiores. Ejus duæ ſunt ſpecies, axungia, πιμέλη, *& ſævum, ſive* ϛέαρ.

They differ; for firſt, *axungia* is in beaſts not horned, which are full toothed; but *ſævum* in beaſts not horned, which are not full toothed.

Secondly *axungia* is eaſily melted, but not ſo eaſily congealed; but *ſævum* is not eaſily melted, but is eaſily congealed.

Thirdly, greaſe is not brittle, but tallow is. The fat under the skin is greaſe; but in the caule, kidneyes, the heart, the eyes, and about the joynts, it is tallow.

The uſes of it are theſe: Firſt, it defendeth the body from the aire; ſo Apothecaries, when they mean to preſerve jucyes, they poure oile upon them.

Secondly, it preſerveth the naturall heat.

Thirdly, it furthereth beauty by filling up the wrinkles of the skin.

Fourthly, in the Muſcles it filleth up the empty places, it is under the Veſſels that they may paſſe ſafely; in the Intrals it helpeth concoction, in the Buttocks it is as down in a pillow.

4. *Membrana carnoſa.*

Membrana carnoſa, or ὑμὴν σαρκώδης, ſo called in Man, not that it is in him fleſhy, but nervous, and ſo *Nervea*; but becauſe in Beaſts, which the Ancients uſed moſt commonly to diſſect, it is endued with fleſhy Fibres; in the birth it is red, but in thoſe of ripe age, white; in the forehead and neck it is more fleſhy. Within it is bedewed with a viſcuous Humour, to further their motion, by keeping the ſuperficies of them from deſiccation, which otherwiſe might fall out by reaſon of their motion. It is of an exquiſite ſenſe, whereof when it is pricked with ſharp Humours, it cauſeth groovings, ſuch as are felt in the beginning of Ague-fits. First, it preſerveth the heat of the internal parts. Secondly, it furthereth the gathering

Its uſes

thering of the fat. Thirdly, it ſtrengtheneth the Veſſels which paſs between it and the skin.

CAP. IV.
Of the proper containing parts.

THE proper containing parts, are the Muſcles of the belly, and the *Periton.um.* Of the muſcles we have ſpoken elſwhere, *Chap.* 17.

Peritonæum is tyed above to the Midriff, below to the ſhare and flank bones; in the fore-part firmly to the tranſverſe muſcles, but chiefly to their Tendons about the *Linea alba*; behinde to the fleſhy heads of theſe Muſcles looſely, and the membrane of the Nerves, which come from the *vertebræ* of the loynes. The end of this firm connexion is to preſſe equally the belly, for the expulſion of the Ordure, and breathing. If this connexion had not been, the *Peritonæum* would have become wrinkled, the Muſcles being contracted. If it had not been looſe tyed to the fleſhy parts, the contraction of them in the compreſſion of the belly had been hindred.

As for the proceeding of it, *Fallopius* wlll have it to proceed from a ſtrong twiſting of ſinewes, from whence the *Meſenterium* hath its beginning. Some will have it to proceed from the Ligaments by the which the *vertebræ* of the loyns and the *Os ſacrum* are tyed together.

Picolhomineus will have them to be framed of thoſe nerves which ſpring out of the *ſpinalis medulla*, about the firſt and third *Vertebra* of the loynes, which are tyed together by both the meninges, when they march further: Here it is very thick, becauſe it was to be much extended.

It is double every where, but chiefly about the *vertebræ* of the loynes, where between the duplications lye the *Vena cava*, the *Aorta* and the Kidneys. In the *Hypogaſtrium*, two tunicles are apparently ſeen, between which the bladder and matrix lie. All the parts which receive nouriſhment from the *Vena cava*, are ſeated between the coats, as the afore-named parts; but thoſe which receive nouriſhment from the *Vena porta*, as are they which ſerve for concoction of the nouriſhment, are not; the umbilicall Veſſels alſo are placed in the duplicature of the *Peritonæum*, that they may march the more ſafely.

To the beginning of the productions of the *peritonæum* the inner coat cleaveth firmly, and ſhutteth the hole by the which the ſpermatick veſſels paſſe from the lower part of the belly. If this be broken, the outer coat is relaxed, and ſo a rupture is cauſed.

The *Peritonæum* is thickeſt; Firſt, where there are manifeſt humours, to hinder the breaking of the ſubjacent parts, and iſſuing out of them, as above the ſtomack.

Secondly, where many veſſels and ſpirits are, as above the ſpleen. Thirdly, where much ſtretching is required, as above the bladder, matrix, and ſtomack.

CAP. V.
Of the Omentum.

Of the part contained in the lower belly

THe parts contained ſerve either for nutrition, or procreation. As for the parts ſerving for nutrition, they either ſerve for chylification, or ſanguification. The principall efficient cauſe of chylification, is the ſtomack; but the adjuvants are the Caube, & the *Pancreas*.

The principall efficient cauſes of ſanguification, are the liver and ſpleen, but the other parts are the adjuvant cauſes. Of theſe ſome receive the excrements of the chylification, as the guts. The excrements of the ſanguification are two, choler, and the watriſh humour. The thinn Choler is received by the *veſica fellea*; but the groſſe choler, by the *meatus cholidochus*: The watriſh humour is turned to the kidneyes, and from thence to the bladder, by the ureters.

The parts appointed for procreation, are the genitals, both in men and women. Next then to the *Peritonæum* is the *Omentum*, or caul, in Greek it is called ἐπίπλοον, παρὰ τὸ ἐπιπλέειν, becauſe it ſeemeth to ſwim above the upper guts. The *Arabians* call it *Zirbus*.

Its ſubſtance.

It is compoſed of two membranes. The uppermoſt doth ſpring from about the bottome of the ſtomack, from the common coat of it, and is tyed to the hollow part of the liver and ſpleen.

Its connexion.

The lowermoſt doth ſpring from the *Peritonæum*, immediately under the midriff towards the back, and is tied to the hollow part of the liver, to the midriff, to the *duodenum inteſtinum*, to the convex part of the ſpleen; and laſt of all, to all that part of the *Colon* which marcheth under the ſtomack.

Its veins

It hath veines onely from *porta gaſtroepiplois dextra & ſiniſtra:* they are inſerted into the upper membrane, but *epiplois dextra & poſtica* into the inferiour membrane.

Its arteries.

It hath ſo many arteries from *ramus cæliacus, & meſentericus.* It hath ſmall ſinewes from the coſtal branch of the ſixth paire. It hath much fat: if it be plentifull, and the caule reach to the *os pubis*, in women it cauſeth ſterility, by compreſſing the mouth of the matrix; in men it cauſeth a Rupture, by relaxing the *peritonæum:* This rupture is called *epiploenterocele.*

Its ſinews.

Its figure 6 *De anat adminiſt.*

In figure it repreſenteth a Faulconers pouch, according to *Galen*: The mouth is round, and the bottome is made by the two membranes joyned together. This will appeare if you fill it with water, by *Galens* advice.

The reaſon of the frame o it.

It is then of ſubſtance membranous, that it might admit dilatation and extenſion. It is thin, that it ſhould not burden the ſubjacent parts; it is compact to hinder the diſſipation of the internall heat, and to repel the externall cold.

The fat. The fat is about the veines and arteries, to ſtrengthen them from being compreſſed by the repletion of the belly, and other motions. When the ſtomack is full, and the guts empty the upper membrane is raiſed, the lower remaining in its owne place; but if the guts be full, and the ſtomack empty, then the lower membrane riſeth up, the upper remaining in its own place. It is tyed to the ſtomack, being a middle part between the colon and the ſpleen; and that it ſhould not totter from ſide to ſide, It is tyed in the right ſide to the colon and liver; but in the left ſide to the ſpleen.

Its beginning. It hath its beginning from thoſe parts unto which it is tyed, that it might receive veines and arteries from thence for bloud aud life. The lower part is free and untyed, that ſomtimes the upper, ſometimes the lower membrane might riſe up.

The uſes of it are three: Firſt, it cheriſheth the internall heat of the ſtomach and inteſtines.

Secondly, it miniſtreth nouriſhment to the parts in time of famine, *Galen. de uſ. part. l.2,c.11.*

The third is to contain the humours flowing from the inteſtines, which the glandules cannot receive wholly at one time, *Hippoc. lib. de glandulis.*

An obſervation

Creatures which have no caul, help the concoction by doubling their hinder legs, and reſting their belly upon them, as Hares and Conies.

Another.

They who have had a portion of it cut off, becauſe it was corrupted, having fallen out by reaſon of a wound received in the *abdomen*, have afterward a weak concoction, and are enforced to cover the belly well. See *Galen. lib. 4. de uſu part.9.* where he proveth this by example.

CAP. VI.
Of the Gula.

The marching of it.

THe Gullet or weazand is an organicall part, which beginneth about the root of the tongue, and paſſeth from thence directly between the wind-pipe, the *vertebræ* of the neck, and the foure firſt *vertebræ* of the breſt, upon the which it reſteth; but when it is come to the fifth *vertebra* of the breſt, it giveth way to the trunke of the great artery deſcending, by turning a little to the right ſide: afterward accompanying the arterie to the ninth *vertebra*, there it is raiſed up by meanes of the membranes from the *vertebra*, and marching above the arterie, it paſſeth through the nervous body of the midriff, and is inſerted into the left orifice of the *ventriculus:* about the eleventh *vertebra* of the breſt.

The names of it.

It is properly called ϛόμαχος ὅτι ϛενὸς ϗ μακρὸς, *quia anguſtus & longus.*

longus: ſee *Ariſtot.* 1. *hiſtor. animal.* 16. It is alſo called οἰσοφάγος, ὅτι οἴσει τὸ φάγημα, *quod cibum ad ventriculum vehat.*

Its ſtructure.

It is framed of three membranes. The firſt is the uttermoſt and common, compaſſing the two proper, which it hath either from the *peritonæum*, according to ſome, or from the ligaments of the *vertebræ* of the neck aud breſt, upon which in reſteth. The ſecond is the middlemoſt, and it is fleſhie and thick, and hath onely tranſverſe *fibres*. The third is the innermoſt, and it is membranous, and hath onely ſmall and ſtraight *fibres*.

Its connexion.

It is joyned to that membrane which covereth the throat, palat, mouth, and lips; ſo that before vomiting, ſignes in the lips will appeare.

The veſſels.

It hath veines both from the *vena cava*, and the *porta*; for it hath ſprigs from *vena ſine pari*, while it is yet in the breſt: but where it is joyned to the ventricle, it hath ſome twigs from *ramus coronarius*,

rius , which proceedeth from the *porta.*

It hath arteries from the intercoſtall arteries, and *ramus cœliacus coronarius.*

Nerves it hath from the ſixth paire, which are carried obliquely, for ſafety, as *Galen* noteth *l. 6, de uſu part.* and are very many; which is the cauſe that the parts about the upper orifice of the ventricle are ſo ſenſible.

Its glandules. It hath foure *Glandules* ; two in the throat, which are called *Tonſillæ*, or Almonds, common to the *Weazand* and the *Larynx* , which prepare the pituitous humour to moiſten them : other two it hath about the middle of it, towards the back, about that place where the *aſpera arteria* is divided into two branches, under which it lieth.

The uſe of it. The weazand ſerveth as a funnell to carry meat and drink to the maw; for it receiveth them by dilating its proper internall coat, and turneth them downe by the conſtriction of the middlemoſt coat, and the muſcles of the *Pharynx*.

CAP. VII.

Of the Ventriculus, *or* *Stomack*.

Its denomination.

THat part which we term the Stomack in English, in Latin is called *Ventriculus*, to diſtinguiſh it from the great ventricles. In Greek, γαστὴρ and κοιλία, from its cavitie.

Its ſituation.

It is placed immediately under the midrife, which it toucheth; wherefore if it be too full, it cauſeth a difficulty of breathing, by hindering the motion of it. In the forepart, and in the right ſide, it is covered with the hollow part of the liver; in the left ſide by the ſpleen; towards the back by the *aorta*, the *vena cava*, and the *pancreas*, which further its heat.

Its bigneſs.

The bigneſſe of it is commonly ſuch, as is capable to receive ſo much food at one time, as is ſufficient for nutrition. It is leſſe in women than in men, to give way to the diſtention of the matrix. They who have large mouths, have large ſtomacks.

Its connexion.

It is joyned with the *gula* on the left ſide, where its upper orifice is: it is tyed to the *duodenum*, where the lower orifice is on the right ſide. The bottome is joyned to the upper part of the caule.

Its ſubſtance.

The ſubſtance of it is membranous, that it might admit diſtention and conſtriction. It hath three membranes. The firſt is common, which it hath from the *peritonæum*, about the upper orifice; it is the thickeſt of all thoſe which ſpring from the *peritonæum*; the fibres of it are ſtraight.

The ſecond is fleſhie, and the fibres of it are tranſverſe, under which a few oblique and fleſhie lye.

The third is membranous, endued with all kinds of fibres; the ſtraight are moſt conſpicuous and plentifull, to embrace the food firmly, untill chylification be perfected, as the ſecond membrane hath oblique to expell the chylus.

Its orifices.

It hath alſo two orifices.

1\.

The one is in the left ſide, called *ſiniſtrum*, wider than that in the right, that meat not well chewed might the better paſſe. It is called inGreek καρδία, *Cor*, from whence the paines which happen in it are called καρδιαλγίαι, and καρδιωγμοὶ, becauſe there is a great conſent between it and the heart, by reaſon of the twigs of nerves which proceed from the ſame branch, which doe ſpring from the ſixth paire, communicate to both; ſo that one being affected primarily, the other muſt ſuffer by conſent.

This hath orbicular fibres, that the meat and drink being once received within the capacity of the ſtomack, it might be exactly ſhut, leſt fumes and the heat ſhould break out, which might hinder concoction.

The other by the Græcans is called πύλορος; *janitor*, or doore-keeper, becauſe it, as a Porter, doth make way for the *Chylus* to deſcend to the *duodenum:* It is not wide as the other *orifice*, becauſe it was onely to tranſmiſſe the elaborate *Chylus*: wherefore beſides its tranſverſe fibres, it hath a thick and compact circle, repreſenting the ſphincter muſcle, that it might the more eaſily open and ſhut.

Its veins. It hath veines, firſt, from the trunck of *vena porta*, and this is *pyloricus ramus*, or from the branches of the ſame: wherefore from *ramus ſplenicus* it hath *gaſtrica*, from whence *Coronaria* ſpringeth; *Gaſtroepiplois ſiniſtra*, & *vas breve*, from the *ramus meſentericus*, before it be divided it hath *Gaſtroepiplois dextra*.

It hath *Arteries* from *ramus cœliacus*, which doe accompany every veine.

Its arteries. It hath many nerves from the ſixth paire, which with the *gula* paſſing through the midriffe, croſſe one another; for the right ſinew doth compaſſe the left and fore-part; but the left, the right and hinder part of the ſtomack. So that the upper part of the ſtomack is of an exquiſite ſenſe. Theſe three veſſels paſſe betweene the common and proper coats, and end in their orifices, in the internal membrane.

The cauſe of hunger.

It is the ſeat of hunger, and ſooneſt doth feele the defect of aliment: for blood being ſpent in the veines, upon the nouriſhment of the body, the *fibres* of the internall membrane of the ſtomack are contracted, and ſo this paine which is called hunger, is cauſed.

Its action *Chylus*

The action of the ſtomacke is Chylification: now *Chylus* is a white juyce, reaſonable thick, like Barley creame, wrought by the faculty of the ſtomack out of the aliments. This is chiefly elaborate by the heat of the ſtomack, yet the adjacent parts putting to their helping hands; as in the right ſide, the liver; in the left, the ſpleen: above the midriffe, below the guts, before the caule, behind the trunks of *vena cava*, and the *aorta*. This heat of the ſtomack is temperate, and ſomewhat moiſt, that this concoction might reſemble boyling.

Its figure

Of figure, it is round moderately; partly, that it ſhould not take too much room; partly, that it might receive much. It is ſomewhat long, and hath two orifices higher than the bottom, leſt if one ſhould have been in the bottom, the aliment unconcocted ſhould have iſſued out of it.

CAP. VIII.

Of the Inteſtines, or GUTS.

The etymon.

THe Guts are called in Latine *Inteſtina*, in Greek Ἔντερα, παρὰ τὸ ἐντὸς εἶναι. They begin at the *Pylorus*, and end in the Fundament.

They have a round figure, that they might contain ſufficient nouriſhment.

The figure.

They are of a membranous ſubſtance, that they might readily have conſtriction and dilatation.

Their ſubſtance

In length, they are ſix times as long as the whole body.

Their length.

They have three coats, one common from the *Peritonæum*, but mediately; for in the *Duodenum*, and that part of the *Colon* which cleaveth to the ſtomack, it proceedeth immediately from the lower membrane of the caule; but in the *jejunum*, *ileum*, the reſt of the *colon*, and thick guts, it proceedeth from the membranes of the *meſenterium*.

Their coats.

They have two proper, to retaine, and expell readily: The outermoſt is membranous, the innermoſt nervous; although it ſeem to be fleſhy, by reaſon of the cruſty ſubſtance with which it is lined; which is framed of the Excrements of the third concoction of the guts themſelves. It is alſo glaſed with a mucous ſubſtance, which is nothing elſe but an excrementitious flegmy ſubſtance, bred in the firſt concoction: This furthereth the expulſion of the *fæces*, and hindereth excoriation, which might be cauſed when ſharp humours paſſe thorow them.

The fibres.

This internal membrane in the ſmal guts hath oblique fibres, but the externall tranſverſe, becauſe theſe are appointed for the retention and expulſion of the *chylus*. But in the thick guts, the inner membrane hath tranſverſe, but the outer hath oblique and ſtraight, becauſe they are appointed for the expulſion of the excrements: The inner membrane of the ſmall guts is full of wrinkles, to ſtay the *chylus* from paſſing too ſoon. Between the common coat and thoſe which are proper, the *venæ & arteriæ Meſaraicæ* march.

Their Veins.

The veins flow from the *Porta*, although not from the ſame branch: For the *duodenus ſurculus*, is ſent into the *duodenum*, and the

Hæmorrhoidalis, to the left part of the *colon*, and the whole *rectum*, as the *dexter meſentericus* is ſent to the *jejunum*, *cæcum*, *ileum*, and the right part of the *colon*. *Epiplois poſtica*, is inſerted into the middle part of the *colon*, which marcheth tranſverſly under the ſtomack; beſides theſe, a ſprig from the *ramus epigaſtricus* of the *vena cava* is ſent to the *inteſtinum rectum*, which maketh the externall *hæmorrhoidal*.

The Arteries. The Arteries ſpring partly from *ramus cœliacus*, partly from both the *meſentericæ*, to the *duodenum*, and the beginning of *jejunum*; a ſprig is ſent from the right *ramus cæliacus*; but to the reſt of the *jejunum*, to *ileum*, *cæcum*, and the right part of *colon meſentericus ſuperior*: to the left part of *colon*, and to the *inteſtinum rectum*, *meſentericus inferior* is ſent. At the laſt, *epiplois poſtica*, which riſeth from the lower part of *arteria ſplenica*, which is the left branch of *arteria cæliaca*, is ſent to the middle part of *colon*, which lyeth under the ſtomack, The Nerves. Nerves they have from the ſixth paire; the *duodenum* hath ſmall twigs from the ſtomach, which goe to the *pylorus*. The other guts have very many, which ſpring from the branch which is beſtowed upon the roots of the ribs: but the *inteſtinum rectum*, about the *podex*, hath foure twigs from the fifth conjugation of thoſe which ſpring from the *os ſacrum*. This is the cauſe why ſo great pain is felt in the *colon*, *&* *rectum* when they are ill affected.

The fat. The guts have fat without, and not within.

The differences of the guts. The guts are of two ſorts; for they are either thin or thick.

The thin The thin, which have thinner membranes, are in number three.

1. The firſt is *duodenum*, becauſe it is thought to have 12 inches in length. It doth paſſe directly under the ſtomack, to the beginning of thoſe guts which begin to be gathered by the *meſenterium*, for this is tyed with it.

2. The ſecond is *jejunum*, or the hungry gut; for in dead carcaſſes

it is for the moſt part found empty; partly, by reaſon of the multitude of the Veins; partly, by reaſon of the acrimony of the choler, which proceedeth pure from the liver. In length it is 12 hands breadth and three inches, and as broad as the ring finger. The internall membrane is longer than the external; for it hath innumerable orbicular, and tranſverſe wrinkles to ſtay the *chylus*. It beginneth on the right ſide, under the *colon*, where the *duodenum* endeth, and the guts begin to be wreathed, and filling almoſt the whole umbilicall region, it endeth into the *ileum*; of all other guts it hath greateſt ſtore of veins and arteries; and by theſe you may finde the circumſcription of it. *Meatus biliarius* is inſerted into the beginning of this gut, which ſendeth choler from the gall, which pricketh the guts to haſten expulſion.

3. The third is *ileum*; it hath thinner membranes than the reſt of the *tenuia*. It is ſeated under the navell,

vell, and filleth both the *Ilia.* It is the longeſt of all the guts, for in length it containeth 21. handbreadths; but it is the narroweſt of all,for it is but an inch in breadth. It hath fewer wrinkles then the *Jejunum*, and leſſer, which about the end of it ſcarcely appear.

It beginneth where both ſmaller and fewer veins appear, and endeth about the place of the right Kidney, where it is joyned both with the *Inteſtinum cæcum*, & *colon.* The external coat of the *tenuia inteſtina* is more thin and fleſhy then the internall. It hath tranſverſe and orbicular fibres, with a few ſtraight to ſtrengthen the tranſverſe. The internall coat it hath partly ſtraight, partly oblique fibres: yet fewer ſtraight than the *craſſa inteſtina* have. Theſe guts have a motion ſuch as worms have when they crawl, or leeches when they ſuck, to draw downward the *chylus*: for it is not in our power to ſend this away, as we do the excrements. The *craſſa inteſtina*

ſtina have not this motion, and by reaſon of this motion, the upper part of the gut may be wrapped in the lower, which cauſeth the ſickneſſe called *ileos* or *convolvulus*.

The thick guts.

Now follow the *inteſtina craſſa*, the great guts; they are three in number alſo.

1. The firſt is called *cæcum* τυφλὸν, the blind gut, becauſe one end of it is ſhut, ſo that at the ſame orifice the *chylus* paſſeth, and returneth. In man it is like a thicke round worme coyled together. It is bigger in an infant than in a man; four inches in length and one in bredth. It is not tyed to the *meſenterium*; but being couched round, it is tyed to the right kidney. In ſound perſons it is alwayes empty. In foure-footed beaſts it is alwayes full of excrements. Apes have it larger than a man, Dogs larger than Apes; but Conies, Squirrels and Rats, largeſt of all, if you conſider the proportion of their bodies.

2. The ſecond is *colon*, κῶλον, παρὰ τὸ κωλύειν. becauſe it detaineth the excrements. It hath its begining from *ileum & cœcum*, and mounting up by the *dextrum ilium*, when it comes to the liver it paſſeth tranſverſly under the ſtomack to the left *ilium*, and from thence to the beginning of *os ſacrum*.

It is tyed firſt to the right kidney in the right ſide, by the externall membrane; then in the middle to the bottome of the ſtomack, and at the laſt unto the left kidney. In length, it is of ſeven hand bredth and ſeven inches. It is the broadeſt of all others that it might contain all the excrements.

It hath cells, which ſpring from the interall tunicle of it: Theſe cels are kept in their figure, by a ligament halfe an inch broad, which paſſeth through the upper and middle part of it all alongſt; this being broken or diſſolved, the cels appeare no more. Their uſe is to hinder the flowing of the excrements to one place, which would compreſſe the parts adjacent.

It hath a valve where it is joyned with *ileum*, like to the *Sigmoides* in the *Sinus* of the heart. This valve ſo ſtoppeth the hole which is common to the *ileon* and *colon*, that flatuoſity cannot aſcend to the *ileum*, much leſſe excrements regurgitate. If one would find this out, let him pour in water into the *Inteſtinum rectum*, and hold up the guts: The water will ſtay when it is come to the valve, if it be ſound. If this valve be relaxed by ſickneſs, excrements may regurgitate; and expelled by vomit and clyſters, alſo come to the ſtomack.

3. The third is *inteſtinum rectum*, the ſtraight gut: it hath its beginning where the *colon* endeth, and endeth where it maketh the *anus*: it is of a ſpan in length, not ſo wide as the *colon*, the muſcle σφινκτὴς is at the end of it: It hath thick and fleſhie externall coats, and ſo a ſolution of unity in it may the ſooner be united. It hath many tranſverſe fibres, few oblique, and ſome ſtreight. It hath veins not from

Porta only as the reſt; but from the trunck of the *Cava* diſcending alſo, which make the externall Hemorrhoidall.

The guts have a threefold uſe; for firſt, they all concoct the *chylus* ſent from the ſtomack better.

Secondly, the ſmall guts digeſt the *chylus*.

Thirdly, the thicke guts expell the excrements.

CAP. IX.
Of the Meſenterium

THe ſubſtance is membranous; Firſt, that it might bee light, and ſhould not preſſe together the veſſell by its weight: Secondly, that it might bee extended into all dimenſions, by reaſon of the fibres: Thirdly, that betweene the membranes it might the more readily gather fat.

It is of a circular figure, which is moſt capable, that it might anſwer the length of the guts, and keep them within a ſmall compaſſe and place likewiſe.

It is framed of two proper membranes, one above another, ſtrong enough; and one common, between which and the proper, the veſſels paſſe ſafely to the guts.

The veins are called *Meſaraica*, theſe ſpring from *ramus meſentericus*, *dexter & ſiniſter*, branches of the *Vena Porta*.

It hath alſo two arteries,the one ſuperior, the othe inferior, branches of the *arteria meſenterica*, which paſſe as the veins doe.

As for the nerves, it hath two on each ſide, ſpringing from the branches of the ſixth pair, which goe to the roots of the ribs ; others it hath from thoſe which ſpring from the *ſpinalis medulla*, between the firſt, ſecond, third and fourth *vertebræ* of the loynes.

Glandules.

That the veſſels mighs paſſe ſafely without ruption,Nature hath placed glandules betweene the divarications of the veins and arteries.

The biggeſt.

The biggeſt of theſe is about the center of the *meſaræum*, where the diſtribution of the veſſels beginneth.

If this become ſcirrhous, the extenuation of the whole body enſueth, becauſe the paſſing of the *Chylus* is hindered: leane perſons have larger glandules than the fat, becauſe the fat doth ſufficiently guard the diſtribution of the veſſels, and preſerveth the heat of the veſſels.

The arteries bring ſpirit; but the veins doe bring both the *Chylus* to the liver, and nouriſhment to the inner parts; but not at the ſame time: As we take breadth by, and let it out by the ſame inſtruments, but not at the ſame time: ſee *Galen* 2 *facult.nat.*13. & 4. *de uſ.part.*14. So at one time the liver draweth from the belly, and at another time the belly from the liver. When the guts are full, the *Chylus* is ſent to the liver; but when they are empty, they draw nouriſhment.

It hath two parts, *Meſaræum*, μεσάραιον, ὅτι μέσον τῶν ἀραιῶν ἐντέρων

ἐστί;

ὄζί; and *μεσοκῶλον, quaſi μέσον τοῦ κώλου*. The firſt tyeth the ſmall guts togethe; the ſecond the thick.

The big-neſſe of the *Meſaraeum*.

The *Meſaraeum* is in the circumference three yards, but a ſpan in bredth.

Its beginning.

It ſpringeth from the ligaments of the *vertebrae* of the loynes, by two roots; the largeſt about the firſt *vertebra*; the other leſſer, about the third. It was fit that it ſhould bee tyed ſtrongly to theſe ligaments, leſt it might have been torne by violent motions, or be pulled from thence by the weight of the guts being full.

And as plants draw their nouriſhment by their roots from the earth, ſo living creatures which have blood, draw their nutriment from the guts, by the meſaraick veines. Wherefore leſt they ſhould ſuffer ruption, Nature would have them to paſſe ſafely between membranes.

The uſe of it then is to carry ſafely the veſſels which paſſe to the guts.

It is tyed before to the ſmall guts; but behind to the firſt and third *vertebræ* of the loyns, from whence it ſpringeth.

It is called μεσεντέριον, & μεσέντερον, *quaſi* μέσον τῶν ἐντέρων.

Meſocolon

Μεσοκῶλον is that by the which the thicke guts are tyed together. *Hippoc. 6. Epid. & Galen. 4. Aphor. 6.* make mention of this. It is tyed in the right ſide, to the right part of the *ileum*; but in the left ſide to the left part of *ileum*, and the muſcle *pſoas*: before it is tyed to the *colon, & rectum inteſtinum.*

CAP. X.

Of the Vena lactea.

Why ſo called.

THis is the opinion of all the ancient and modern Writers, concerning the meſenterie, and the meſeraicall, if you except *Caſpar Aſellius*, who by his diligence found theſe veins, which hee calleth *lacteas*, becauſe they contain a white juyce, which is nothing elſe but the *chylus* elaborate, which they carry from the ſmall guts to the liver.

Their beginning ſeemeth to bee in the *Pancreas*, for there they all meet, and are ſtrangely implicate and twiſted together: from thence they paſſe upward to the liver, and downward to the ſmall guts: ſo that the *Pancreas* is a more excellent part than it hath been hitherto taken by other Anatomiſts: and as the mothers blood before it bee ſent by the *vaſa umbilicalia* to nouriſh the infant, is firſt ommitted to the *placenta uteri*, to draw from it all impurity: ſo then theſe *vena lactea* diſcharge their impurities, before they carry the *chylus* to the liver in the *Pancreas*.

Their beginning.

They are inſerted into the ſmall guts, and have nothing to doe with the ſtomack. They paſſe into the capacity of the guts, and end in the wrinkled cruſt, with the which the internall membrane of the guts is lined, with their ſpongious heads like to Leeches, by the which they draw

Their inſertion

draw to themſelves the *chylus.*

Their progreſs.

From the ſmall guts, they march betweene the two membranes of the *meſenterium*, ſometimes ſevered from the other veſſels, ſometimes joyned with them, ſometimes directly, ſometimes over-riding them, making a Saint *Andrewes* croſſe thorow the *glandules*, untill they come to the *Pancreas*, where they are inexplicably twiſted one with another: from thence having greater branches they paſſe by the ſides of *vena portæ* to the cavity of the liver, where they are ſpent by ending there by ſmall twiſts: and ſo it is moſt likely that ſanguification is performed by the ſubſtance of the liver, and not by the veins: the groſſer part of it being ſent to the branches of *vena portæ*, and the ſubtilleſt to the branches of *vena cava.*

The difference betweene them and the ordinary meſaraicall veins.

They differ from the ordinary meſaraicall veins;

Firſt, in bigneſſe; for theſe are bigger, but thoſe are more in number; for they are twice as many:

for more *chylus* muſt be ſent to the liver to make blood of, for the nouriſhment of the whole body than blood for the nouriſhing of the inward parts only.

Their valves.

Secondly, the valves which are ſeene about the endings of theſe; are placed from without inwards, but of theſe from within outwards. The reaſon of this diverſity is this: the *venæ lacteæ* ſuck the *chylus* from the guts, which ought not to returne; but the ordinary meſaraicall ſend blood, and ſometimes excrementitious humors, which ought not to come backe again.

How to find them out.

If you would find out theſe veins, you muſt feed a dogge with milk, and five or ſix houres afteward diſſect his belly; then by ſtretching the meſentery you ſhall perceive them.

Why the Ancients did not finde these out.

That the Ancients did not find out theſe veins, the cauſe is, either becauſe they diſſected beaſts after they were dead, or after that the *chylus* was diſtributed, or they did preſently take a view of the meſentery; but made ſome ſtay about the inſpection of ſome other part.

Why they have no trunck.

They have no trunck, becauſe they were to end in the liver, and to goe no further. From this part many diſeaſes ſpring: firſt, becauſe it is compoſed of two membranes, having innumerable veins and arteries, and ſo it may containe many impurities: ſecondly, becauſe it hath many glandules, which as a ſponge imbibe ſuperfluities.

CAP. XI.

Of the Pancreas.

IT is called παγκρέας, and καλλικρέας. It is the biggeſt glandule of the whole body, and very red, like unto ſoft fleſh, from whence it hath its name.

In figure it is ovall, three or foure inches in length. It is placed in the left ſide towards the ſpleen; above, the ſtomack reſteth upon it; below, the membranes of the *peritonæum*

ritonæum lie, unto which it is firmly tyed. It doth keepe within it ſelfe *ramus ſplenicus*, the left branch of *arteria cœliaca*, the nerves which paſſe from the ſixth paire to the ſtomacke and the *duodenum*.

It hath a membrane from the *peritonæum*, by the which it is covered and holden up.

It hath three uſes. Firſt, it ſtayeth the liver, leſt it being diſtended by too much meat and drink, ſhould be hurt by the hardneſſe of the *vertebra* of the back.

Secondly, to keepe the veſſels paſſing through it from ruption.

Thirdly, to keep theſe ſame from compreſſion, when the ſtomacke is too much ſtretched by meat and drink.

CAP. XII.

Of the Liver.

Now follow the parts appointed for ſanguification, whereof the Liver is the chiefeſt.

THe ſubſtance of the Liver ſeemeth to bee a red fleſhy maſſe. In the firſt formation of the birth it is framed of blood wizing out of the veines, and there coagulating about them.

The ſubſtance of the Liver is ſo ſet about the branches of the *vena portæ* and *cava*, that it filleth up all cavities, and doth firmly ſtay them, keeping them open from purſing together, and in comely order, that they be not confounded. It is the thickeſt and heavieſt of all other entralls.

Its bigneſs.

It is bigger in man than any other living creature, if you conſider the proportion of his body; for it was fit ſo to be, ſeeing man was to have the greateſt ſtore of blood, leſt ſpirits ſhould faile in performing the functions of the ſoule, wherewith man is moſt copiouſly furniſhed. Beſides, ſeeing he hath but one Liver, the bigneſſe was to recompence the number: wee may gheſſe of the bigneſſe of it by the bigneſſe of the fingers.

It is covered with a very thin membrane, which ſpringeth from the ſecond ligament of the Liver, which cleaveth firmly to the ſubſtance of the Liver. If it be ſeparate at any time by a watriſh humour, iſſuing out of the veſſels from the fleſhie ſubſtance, watriſh puſtuls, by the Grecians called ὑδατίδες, are ingendered. If theſe doe breake, the water falleth into the cavity of the belly, and cauſeth that kind of dropſie called *aſcites.*

It hath veines as well from the *cava* as the *porta.*

Its veins. The branches of the *cava* are diſtributed for the moſt part thorow the gibbous part; but thoſe of the *porta*, into the hollow part: yet ſo that the branches of both are joyned by inoſculation to deliver the pureſt blood to the *vena cava*, for the nouriſhment of the vitall parts; and the groſſeſt by the branches of the *porta*, for the nouriſhment of the naturall. There ſeemeth to be three times more of the twigs of the *porta*, than of the *cava*, within the liver.

Amongſt the midſt of the branches of the *porta*, ſome little veins march; which afterward becomming one twig, end in the *veſicula fellea*, that the bilious humour may be ſent to it, before the blood enter into the *vena cava*.

Its arteries.

It hath onely few arteries, which ſpringing from the right branch of the *cœliaca*, end in the hollow part of the Liver, where the *vena porta* commeth out.

Its nervs.

It hath two nerves, but very ſmall, becauſe it hath but a dull ſenſe. One commeth from the branch which is ſent to the upper orifice of the ſtomack, the other from that branch which is diſperſed thorow the roots of the ribs of the right ſide.

Its figure

As for the figure of it, it is almoſt round; the upper part is arched and ſmooth, and ſo framed, that it might not hurt the *diaphragma.*

The lower part is hollow to receive the ſtomack, which is of a ſphericall figure.

Its ties.

In the upper and convex part, which is diſtant but one inch from the *diaphragma*, to give way to it when it is dilated in breathing, and to the ſtretching of the ſtomack: it is tied firſt to the *diaphragme*, by a ligament membranous, broad, and ſtrong, which ſpringeth from the *peritonæum*, where it covereth the midriff in the lower part. It paſſeth tranſverſly by the Liver, to the hinder parts; by this ligament, it is ſtayed from falling downe. It is called the Suſpenſory.

Secondly, in the fore-part it is

ſtayed by two ties; by the firſt it is tied to the *mucronata cartilago*, to hinder it from falling to the back parts, when we ſtretch our back: this ligament is broad, double, and ſtrong, and ſpringeth from the *Peritonæum*, and giveth the Liver its coat. Into this coat the two ſinewes are implanted, according to *Galen, lib. 3. de loc. affect. cap. 3.* and not into the ſubſtance of the Liver; ſo that, according to *Galen. 4. de uſ. par. cap.* 13. it hath but a dull feeling, ſuch as plants have to embrace that which is profitable, and to leave that which is unprofitable.

By the ſecond it is tied to the navell: this is the umbilicall veine, which when the Infant is borne, loſeth its hollowneſſe, and becommeth a ligament. This ſtayeth it from being pulled upwards.

Thirdly, it is tyed to the ſhort ribs, by ſmall fibres, to keepe it ſteady. In the hollow part it is tied by the *meſenterium*, to the ribs by the *vena cava*.

Its differences from the Liver of beaſts.

It differeth from the Liver of beaſts, in that it hath ſeldom any lobes; yet the hollow part of it hath a fiſſure, or chink wherein the umbilicall veine is implanted, and two ſmall bunchings out in the right part, where the *Vena portæ* marcheth out, which *Galen* calleth πύλας, gates.

A little Lobe.

Beſides theſe, there is a little lobe of a ſofter and thinner ſubſtance than is the reſt of the Liver, and is covered with a membrane: It is tied to the *Omentum* by this lobe, by the which *Spigel. de human.corp. fabric. lib.* 8. *cap.* 12. thinketh that waters may be diſcharged out of the Liver into the caul.

Its ſituation.

It is placed in the lower belly, in the right ſide, covered with the ribs for ſafety, and in the middle of the trunck of the body, to ſend blood equally to the upper and lower parts. The ſtomack is cheriſhed by it, and the ſpleen; but becauſe it is a more noble part than the ſpleen, it is placed in the right *hypochondrium*.

Its action The proper action of it is not only to further ſanguification, perfected in the veines, as all ancient Anatomiſts averre; but to ſanguifie the *chylus*, carried to it by *vena lactea*, as *Aſellius* hath proved.

A note. One thing is to be noted, that the ſubſtance of the Liver, in the convex part, where the *vena cava* is lodged, is ſofter than that which is in the hollow part, where the *vena portæ* is: for there it may be more eaſily ſeparate from the veſſels, than here; and not without cauſe: for the roots of *vena portæ* ought to bee ſtayed by a harder ſubſtance, that they be kept wider; but the roots of the *cava* with a ſofter, that they might the readier be filled, ſtretched, and ſlacked.

CAP.

CAP. XIII.
Of the vena portæ.

SEeing the roots of the veines which Nature hath appointed to furniſh blood, the nutriment of the body, have their roots in the Liver: having diſcourſed of it, method doth require to ſet downe the doctrine of them.

The veins of it.

Although there is but one artery to impart life, yet there are two veines, the *vena portæ* and *cava.* Becauſe ſome require a groſſer blood for nutrition as thoſe parts are which ſerve the nutritive faculty, which are, the liver, the gall, the ſtomack the ſpleene, the *pancreas*, the *omentum*, the guts, aud the meſentery. For unto the reſt, as the kidneyes, bladder and thoſe which are appointed for procreation, the *vena cava* ſendeth branches.

Vena portæ.

It is fit to begin with the *vena portæ*, becauſe it goeth no further then to the parts contained in the abdomen, and not to all thoſe neither.

Why ſo called.

It ſo called, becauſe it ſeemeth to enter into the liver by the two fl ſhy bunches called *portæ*, gates.

How it differeth from *Vena cava.*

This both differ from the *vena cava.*

Firſt, in ſubſtance; for the ſubſtance of this is thicker and blacker, becauſe it is nouriſhed with thick and and black blood; but that of the *vena cava* is whiter and thinner, becauſe it is nourſhed with a thinner and redder blood.

Secondly, the ſubſtance of the *vena porta* is harder than that of the *cava*; which ought to be ſofter, becauſe it ought to be more apt for dilatation and conſtriction; firſt, becauſe it containeth a more moveable blood; partly becauſe its thinner, having much ſeroſity mingled with it; partly, becauſe for the moſt part the branches of it are accompanied with the branches of the great artery, whereas the branches of the *porta* are farre enough off, if you except *ramus ſplenicus.*

Thirdly, the trunck of *vena cava* is larger than that of *porta*, becauſe it nouriſheth more parts, as hath been ſaid.

Fourthly, the *porta* hath more roots within the ſubſtance of the liver than the *cava.*

How inoſculation is performed.

The roots of the *vena portæ* and *cava* are joyned by the unition called *Anaſtomaſis*, or inoſculation. This is performed by two wayes: Firſt, when the ending of one doth meet with the end of the other; as the *epigaſtricæ venæ* meet with the *mammariæ* in the lower ſide of the *muſculi recti.*

Secondly, when one branch reſting upon another, does cleave together, having a hole in the middle; this inoſculation is ſeene in the roots of the *vena portæ*, and the *cava.*

A note.

One thing is to be noted, that there are many of the twigs of the *vena portæ* which touch not thoſe of the *cava*; becauſe the pureſt part of the blood was onely to be carried to the *vena cava*, and the thickeſt to remaine in the *vena portæ*. By reaſon of theſe *Anaſtomaſes* in famine nouriſhment is ſent from the habit of the body, by the *vena cava*, to nouriſh rhe internal parts.

Bauhin affirmeth, that there is a common conduit to the roots of *vena porta* and *cava* which in its cavity will receive a ſmall probe. In theſe veines, beſides blood, excrementitious humours are alſo contained in diſeaſed perſons, which ſometimes are ſent from the whole body by the *vena cava* into the guts, and ſometimes communicate to the *vena cava* by *vena porta*.

How the inoſculation of theſe veins is found out.

To find out the radication and inoſculation of theſe veines, you muſt boile the liver untill it become ſoft, and ſo with a woodden or bone knife ſeparate the ſubſtance from the veſſels; for a ſharp knife is not fit.

Now to come to diſtribution of

vena portæ, it hath parts: 1 *Radices*, the roots. 2 *Truncus*, the trunck. 3 *Rami*, the branches. 4 *Surculi*, twigs.

The diſtribution of *Vena portæ*.

Its roots

As for the roots, firſt from the circumference of the Liver, ſmal capillar veins march towards the inner part of it; and by combination becomming greater, they make up five branches. Theſe about the middle of the hollow part, yet towards the back joyning together, make up one root, which at the laſt comming out of the liver, about the eminences, called *portæ*, frame that trunck which is called *Vena portæ*.

Its branches.

This trunck parting a little from the liver, before it be ſevered into branches, it puts forth two twigs; the one being ſmall and ſpringing from the upper and forepart of the trunck, as ſoon as it parteth from the liver, is inſerted into *Cyſtis fellis*, about the neck of it, and ſpread by innumerable twigs, thorow the externall coat of it.

Veſalius affirmeth, that there be

two of theſe twigs, from whence ſome call them *cyſticæ gemellæ*: but this is a matter of no great moment. This twig may be called *ſurculus cyſticus*, or *veſicalis*.

The ſecond twig is bigger, but lower. This ſpringeth from this ſame forepart, yet towards the right ſide, and is inſerted into the bottom of the ſtomack: from hence it ſendeth many ſprigs toward the hinder part of it, towards the back.

It may be called *Piſtoricus*, more properly then *Gaſtricus*, ſeeing there are other branches, which are called *Gaſtrici*. Having ſent forth thoſe two twigs, the trunck paſſeth down, and bending ſtill a little towards the left ſide, it is parted into two remarkable branches; whereof the one is called *ſiniſter*, or the left, ſeated above the right, but leſſer: the other is *dexter*, or the right, lower then the left, yet larger: the left is beſtowed upon the ſtomack, the *omentum*, a part of colon, and the ſpleen: the right is ſpred through the guts, & the *meſenterium*; the left is called *vena ſplenica*, but the right, *vena meſenterica*.

B anches of *Vena ſplenica*.

The *vena ſplenica* hath two branches before it come to the ſpleen, the ſuperiour and the inferiour. The ſuperiour is called *gaſtricus*, or *ventricularis*. This is beſtowed upon the ſtomack; the middle twig compaſſing the left part of the orifice of the ſtomack like a garland, is called *coronaria*: from the lower branch two twigs doe ſpring, the one is ſmall; this doth ſend other twigs to the right ſide of the lower membrane of the *omentum*, and to the colon annexed to it. This is called *epiplois*, or *omentalis dextra*; the other is ſpent upon the lower membrane of the *omentum*, which tieth the colon to the back, and upon that part of the colon it is called *epiplois*, or *omentalis poſtica*: when the *ramus ſplenicus* hath approached to the ſpleen, it doth ſend out two other twigs, the uppermoſt and the lowermoſt: from the uppermoſt *vas breve* ſpringeth, which is implanted in the left part of the bottome of the ſtomacke commonly: from the lowermoſt, two twigs iſſue.

The firſt is called *gaſtroepiplois ſiniſtra*, this comming from the lower part of the ſpleen towards the right ſide, is beſtowed upon the left part of the bottome of the ſtomack, and the upper and left part of the *omentum*.

The ſecond ſpringeth moſt commonly from *ramus ſplenicus*, but ſeldome from the ſpleen; and paſſing along according to the length of the *inteſtinum rectum*, it is inſerted into the *anus*, by many twigs. This is called *Hæmorrhoidalis interna*, as that which ſpringeth from the *vena cava* is called *hæmorrhoidalis externa*.

Vena Meſenterica. Now followeth *vena Meſenterica*, or the right branch of *vena portæ*; before it be divided into branches, it ſendeth forth two twigs.

The firſt is called *gaſtroepiplois ſiniſtra*,

ſiniſtra, this is beſtoed upon the right part of the bottom of the ſtomack, and the upper membrane of the caule.

The ſecond is called *inteſtinalis*, or *duodena*: It is inſerted into the middle of the *duodenum*, and the beginning of the *jejunum*, and paſſeth according to the length of them. This branch as ſoone as it paſſeth from the back, it entereth into the *meſenterium*, and paſſing between the membranes of it, ſendeth forth thoſe meſeraicall veins, which ſend nouriſhment to the inward parts.

It is divided into two branches, to wit *Meſenterica dextra*, & *ſiniſtra*: *Meſentrica dextra*, placed in the right ſide, ſendeth a number of branches to feed the *jejunum cœcum*, and the right part of the *colon*, which is next to the kidney and liver.

It hath fourteene remarkable branches, but innumerable ſmall twigs. One thing is to bee noted, that the greater branches are ſupported by the greater glandules, and the ſmaller by the ſmaller glandules. *Meſenterica ſiniſtra* paſſeth through the middle of the *meſenterium*, and that part of *colon* which paſſeth from the left part of the ſtomack, to the *inteſtinum rectum*.

Its uſes.

The chiefe uſe of the *vena portæ* is, to nouriſh the parts which are appointed for nutrition, with thick and feculent blood: It ought to be thick, that it might bee the hotter; for heat in a thick body is more powerfull.

The ſecond uſe is to further the ſanguification of the liver.

CAP. XIV.

Of the Vena cava diſperſed within the trunk cf the body.

WIthin the trunck of the body, the *vena cava* hath two truncks; one called *aſcendens* or going up, the other *deſcendens* or marching down.

The *aſcendens* paſſing through the nerves, part of the *Diaphragma*, it marcheth upward undivided, until it come to the *jugulum*: yet by the way from its ſides it ſendeth two twigs. Its ſprigs

1. The firſt is *Phrenica*; this is inſerted into the midriffe and heart; from hence ſpringeth the *coronaria vena* which compaſſeth the baſis of the heart, as a garland.

2. The ſecond is *vena ſine pari*, ſo called, becauſe it hath not a fellow in the left ſide, as other veines have. It doth ſpring about the fifth *vertebra* of the breſt, from the hinder part of the *vena cava*, in the right ſide. This going down, it marcheth towards the *Spina*: when it is come to the eighth or ninth rib above the *Spina*, it is divided into two branches, to wit, the right, and the left; the left is inſerted moſt commonly in the middle of the left emulgent vein. By this branch, blood, or wateriſh or purulent matter may be diſcharged by urine; the right twig is implanted The branches of *Vena ſine pari.*

either into the trunck of the *cava*, or into *prima lumbaris.*

This being done, the *vena cava* aſcendeth up to the *Jugulum*, being ſtrengthened by the *Mediaſtinum*, and the glandulous body called *Thymus*. Here the *Vena cava* is divided into two remarkable branches, from whence thoſe veins ſpring which are ſent to the head, to the armes, and ſome muſcules of the *abdomen*. One paſſeth to the right ſide, the other to the left; the one is called *ſubclavius*, becauſe it marcheth under the cannel bone within: The other is called *axillaris*, when it is come to the arm-pit; from the upper part of the *Ramus ſubclavius* two remarkable branches proceed: the internall and externall jugular; in man the internall is biggeſt, but in beaſts the externall.

The branches of *Ramus ſubclavius.*

1. The internall jugular commeth out about the articulation of the cannel-bone with the *Sternum*; then it joyneth it ſelf with the ſoporall artery, and the recurrent nerve:

nerve;and with its hinder and greateſt branch, accompanied with the ſoporall arterie it entereth with the *cranium* at the hole of the *occiput*, by the which the ſixth paire of nerves commeth downe, it entreth into the firſt and ſecond *ſinus* of the *dura mater*,

2. The externall jugular mounteth up to the eare under the skin, and the quadrat muſcule which pulleth down the cheek alongſt the neck: from this branch ſpring the veins which are opened under the tongue.

Springs ſpringing from the lower part of *Ramus ſubclavius*

From the lower part of *ramus ſubclavius*, ſpring foure branches.

The firſt, *Intercoſtalis ſuperior*, one on each ſide; it is ſmall, and commeth out about the root of the bifurcation: then paſſing downe by the roots of two ribs, it beſtoweth twigs upon the diſtances of theſe two ribs.

The ſecond is *Mammaria*, this marcheth forwards towards the upper part of the breſt bone: then it goeth downe by the ſides of it, and when it is come to *cartilago mucronata* about the ſides of it, it commeth out: from thence it paſſeth ſtraightwaies under the right muſcle to the navell, where by an *anaſtomoſis* it is joyned with the *epigaſtrica aſcendens*: from hence commeth that great conſent between the matrix and paps.

The third is *Mediaſtina*, becauſe it is beſtowed upon the *mediaſtinum*, together with the left nerve of the *diaphragma*, according to its length.

The fourth is *Cervicalis*, or *Vertebralis*. This paſſing thorow the holes of the tranſverſe proceſſes of the *vertebræ* of the necke, is beſtowed upon the muſcles of the neck which are next to the *vertebræ*.

CAP. XV.

Of the Gall.

The deſcription of it.

THe Gall, called in Latine *Veſica biliaria*, or *Folliculus fellis*, is a diſſimilary part, in figure repreſenting a Peare, hollow, and appointed to receive the thin yellow choler.

Its bigneſſe.

It is about two inches in length.

Its connexion.

By its upper part it is tied to the liver, which doth afford it a hollowneſs to receive it; but the lower part which hangeth without the liver, it reſteth upon the right ſide of the ſtomack, and the *colon*, and doth often die them both yellow.

Its membranes.

It hath two membranes, the one common, which is thin and exterior, without *fibres*. This ſpringing from the membrane of the liver, it onely covereth that part which hangeth without the liver; The other membrane is proper.

This

The fibres of the propermembrane.

This is thick and ſtrong, and hath three ſorts of Fibres, the outtermoſt are tranſverſe, the middlemoſt oblique, and the innermoſt ſtraight.

This membrane is harder and thicker in the neck; but thinner in the bottome. Within, it hath a mucous ſubſtance, engendered of the Excrements of the third concoction of the membrane, to withſtand the acrimony of the choler.

The parts of it.

It hath two parts, the neck, and the bottome.

The neck is harder than the bottome, and higher in ſituation.

It from the bottome by degrees growing narrower and narrower, at laſt endeth in the *Ductus communis*, or the common paſſage of the choler, to the beginning of the *Jejunum*.

This elongation of the neck of the *veſicula fellea*, is called *meatus cyſticus*, becauſe it ſpringeth from the *Cyſtis*.

The choler is carryed to the neck of

How the choler is carried to the gall.

of the *cyſtis*, by many ſmall veins, near to the roots of the *vena portæ* about the midſt of them, and is diſcharged into the cavity of it, about the upper part.

Its valves.

The *meatus cyſticus* hath three valves, looking from without inwards, to hinder the recourſe of the choler to the Liver.

Meatus hepaticus.

The other paſſage which carryeth the thick and corrupt choler, as that which is called *vitellina, æruginoſa, porracea, &c.* is called *meatus hepaticus*; becauſe it paſſeth ſtraightway from the Liver to the *ductus communis*.

This paſſage hath no Valves; both theſe diſcharge their choler by the common paſſage into the beginning of the *Jejunum*, when the ſmall guts are diſcharged of the *Chylus*.

What beaſts have this paſſage only.

Beaſts which want the *veſica fellea*, have this *meatus hepaticus*, as Harts, Hynds, and fallow Deere, and thoſe which have a whole hoof.

The *Meatus hepaticus* paſſeth

thorow the roots of the *vena cava*, by innumerable branches, which being gathered together become one branch; and being united with the *meatus cyſticus* make up the *communis ductus*, which is inſerted into the beginning of the *jejunum* obliquely, between the two membrances of the inteſtine, about the diſtance of two inches, before it perforate the ſecond membrane.

The *veſica fellea* hath for nouriſhment called *cyſticæ gemellæ*.

Its veſſels.

For life it hath ſprigs of arteries proceeding from the *Cæliaca*. To afford ſenſe, it hath a ſmall threed like a ſprig of a ſinew from the ſixth paire.

Of the ſtones in it.

Many times ſtones are found in it, but they being lighter then thoſe of the bladder, ſwim above the water.

The uſe of the paſſages.

The uſe of theſe two paſſages, is to draw all ſuperfluous choler from the *chylus*, and to turne it into the guts, where it affordeth benefits to nature:

The uſes of the choler.

For firſt by its ſharpneſs it moveth the inteſtines to turne out the terreſtrial excrements in due ſeaſon.

2. Secondly, by reaſon of its thinneſſe it doth cut and cleanſe the ſmall guts of flegme, which there is plentifully bred.

3. Thirdly, by reaſon of its drineſſe it hindreth the encreaſe of putrefaction.

4. Fourthly, it furthereth concoction in the inteſtines by encreaſing their heat: neverthelesſe, naturally there can be no paſſage to carry choler to the bottome of the ſtomack.

Why choler is not caryed to the ſtomack.

1. For firſt, by reaſon of its acrimony it would corrode it.

2. Secondly, it would cauſe the crude nouriſhment to paſſe into the *duodenum*.

3. Thirdly, it would procure perpetuall vomiting. If it fall out that choler be carried to the bottome of the ſtomack by any paſſage than this, the party vomiteth choler, and is termed πικρόχολος ἄνω, but if it bee inſerted into the end of the *jejunum*,

then bilious dejections follow: and ſuch a one is termed πυρόχολος κάτω.

A note.

One thing I would have you obſerve; that the *porus biliarius* paſſeth by a ſtraight courſe to the *ductus communis*, and not to the *veſicula fellea*, which thus you may ſhew: put a *catheter* into the necke of this paſſage neere the liver, the guts will bee blowne up, and not the *veſicula*. Againe, put the *catheter* into the common paſſage, and both the *cyſtis fellis*, and the *meatus cholidocus* will bee blowne up.

How the valvs are found out.

If you would finde out the three valves of the *veſicula fellea*, preſſe the choler with your fingers from the bottome towards the necke; where you finde the choler to ſtay, there the valves are.

CAP. XVI.

Of the Spleen.

THe Spleen or Milt in Engliſh, in Greek is called *Splen*, and *Lien* in Latin.

Its ſubſtance.

The ſubſtance of it is flaggie, looſe and ſpungeous, net-like, which is the cauſe that it may imbibe much ſuperfluity, and ſo become exceedingly ſwelled.

Its membrane.

This ſubſtance is covered with a membrane borrowed from the *Peritonæum*, which is inſerted firſt into the ſtraight line of the Milt, and then covereth the whole Spleen: It is thicker than that of the liver. Firſt, becauſe it hath a looſer ſubſtance. Secondly, becauſe it hath more arteries, which require a ſtrong membrane to defend them. The ſtraight line is in the hollow part, where the veſſels of the Spleen doe enter into it.

Why it is red in Infants.

In infants new born it is of a

red colour, becauſe they have been fed with elaborate blood; but in thoſe of a ripe age it is ſomewhat blackiſh: being boiled it repreſenteth claret wine. In man it is bigger, thicker, and heavier, then in beaſts; for it is ſix inches in length, three in bredth, and one in thickneſs; yet according to *Ariſtotle*, 3, *hiſt. Animal.* 6. a convenient little one is better then a big one.

Its figure In figure it is ſomewhat long, like an Oxes tongue.

Its ſituation. It is ſeated in the left *hypochondrium*: ſo *Hippocrat.* 6 *Epidem.* calleth it the left liver; and *Ariſtot.* 3. *part. Animil.* 7. the baſtard liver, but is ſeated ſomewhat lower, becauſe it was to draw the terreſtriall part of the *Chylus*, before it come to the liver by *ramus ſplenicus*, that the blood may be made thinner, and purer; for ſuch blood cauſeth men to be wiſer, 2. *de part. amin.* 2. It is all couched within and under the ſhort ribs; ſo that in healthful perſons it cannot be felt;

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onely if it be inflamed, a pulſation may be felt.

Its connexion.

It is tyed to five parts; to the midriff and left kidney by ſmall membranes, by its hollow part which giveth way to the ſtomack, being diſtended to the upper membrane of the *omemtum*, and to the ſtomack by *vas breve*. In its arched part it is tied to the back, ſo that dints remain in it by the impreſſion of the ribs.

Its veſſels.

It hath veines for nouriſhment from *ramus ſplenicus*; for life it hath arteries from *ramus cœliacus ſiniſter*; but five times more than veines, for great heat is required for the elaboration of thick blood. Theſe veſſels enter into the ſpleen where the ſtraight line is in the hollow ſide. They joyne often by *anaſtomoſes*.

The uſes of the arteries of the *ſpleen*. 1.

The arteries beſides life afford unto the ſpleen two benefits.

Firſt, they encreaſe the naturall heat of it, that it may the better concoct the groſſer part of the *Chylus*,

Chylus, which is ſent unto it by the *ramus ſplenicus*.

Secondly, they further the expulſive faculty of it.

By what ways the Spleen ſendeth its ſuperfluities to the Kidneys.

Now the ſpleen ſendeth its ſuperfluities to the kindneyes by two wayes.

1. First, by returning of them by *ramus ſplenicus* to the *vena portæ*, and from thence to *vena cava*, from whence they are ſent to the emulgent veines.

2. Secondly, by a ſhorter paſſage they are ſent from *arteria cœliaca* to the *aorta*, and from thence to the kidneyes by the emulgent arteries.

Laſt of all, it hath ſmall twigs of nerves from the ſixth pair, which are beſtowed upon the inveſting membrane, but are not communicate to the ſubſtance: wherefore it muſt be but of a ſmall and dull feeling: ſo that the paines which ſundry aſcribe to the ſpleen, are to be referred to the adjacent parts.

The uſe of the Spleen.

The uſe of the ſpleen, as alſo of

the liver, is to further the elaboration of the concoction of the *Chylus*: for it is a baſtard liver, according to *Ariſt.3.de Hiſtor. animal.7.*

How the ſanguification of the ſpleen differeth from that of the Liver.

The ſanguification of the ſpleen differeth iu two points from that of the liver.

1. First, in the materiall cauſe; for the ſpleen maketh groſſe blood of the more earthly pArt of the *Chylus*; but the liver farre purer of the thinner and more benigne part of the *Chylus*.

2. Secondly, it differeth in the finall cauſe; for the live ſanguifieth to afford nouriſhment both to the vitall and animall parts; but the ſpleen onely to maintaine the naturall parts, and not all of them neither.

Why the naturall parts are nouriſhed with groſſe blood.

Nature would have the naturall parts to bee furniſhed with groſſe blood by the branches of *vena portæ*, partly to encreaſe their heat; for heat in a thicke body is ſtronger; partly to afford them nouriſhment anſwerable to their ſubſtance, for it is thick.

Of the kidneyes.

CAP. XVII.

Their denomination.

THe kidney is called in Latin *Ren*, from ῥέω, to flow; becauſe the feroſity of the blood doth flow through the kidneyes to the ureters, and from thence to the bladder.

Their number.

They are in number two; not ſo much for the poiſing of the body, as for their uſe and neceſſity; that one being ſtopped, yet the clenſing of the blood might be performed by the other.

Their places.

They are ſeated in the loynes under the liver and ſpleen, and reſt upon the muſcles called φόαι, which move the theyght about their heads, under the which large nerves are couched. which is the cauſe that a big ſtone being in the kidney, a numneſſe is felt in the foot of that ſide, the muſcle φόα being preſſed down by it: They lie behind the guts. The right kidney hath the *cæcum*, but the left the *colon* above it. In man the right kidney is loweſt, by reaſon of the greatneſs of the liver, and bigger alſo then the left; yet it is not ſo fat as the left, by reaſon of the vicinity of the liver; whoſe heat hindereth the encreaſe of fat.

Their figure.

In figure they reſemble the *aſarum* leafe, or kidney beane: towards the loynes they are gibbous, but hollow towards the guts.

Their connexion.

As for their connexion, by the external fat membrane they are tied to the *diaphragma*, and the loynes; by the emulgent veſſels to the *vena cava*, and the *aorta*, and by the ureters to the bladder.

Their bigneſs.

They are in length about five inches, in bredth three, and in thickneſs one; yet they are ſomewhat broader above then under. They are ſmooth in the gibbous part, but unequal in the hollow part, to let in and out ſome veſſels.

Their parts.

The parts are two; to wit, the externall and the internall; the externall are the membranes; theſe are two.

Their membranes.

The one is common and externall, borrowed from the *Peritonæum*; within the reduplication of which, the whole Kidney is lapped; and therefore it is called *Renis faſcia*. This membrane is compaſſed with copious fat; ſo that the Kidney ſeemeth to be the fatteſt of all other intrals, according to *Ariſt*. 3. *Hiſt. Animal*. 17. Although each one be exceedingly fat, yet ſome part of the Kidney will remain uncovered about the middle.

The uſes of the fat of the kidneyes.

This fat about the Kidney hath a threefold uſe. Firſt, it is in ſtead of a pillow.

Secondly, it receiveth as a ſponge the excrements.

Thirdly, it furthereth and keepeth in the heat.

Before you deprive the Kidneys

of this *tunica adipoſa* with your nailes, about the upper part of the kidney, you are to obſerve a large glandule, which hath a ſprig from the emulgent vein and artery, for nouriſhment, about the middle of it.

Renes ſuccenturiati.

Their figure.

In figure it repreſenteth a halfe moone, and is not unlike a kidney; from whence it is called *ren ſuccenturiatus*. There is one on each ſide in the upper part of the kidney, reſting upon the *tunica adipoſa*.

Their connexion.

It is ſtrongly tied to the *ſeptum tranſverſum*.

The ſubſtance of it is more flaggy than that of the kidney.

Their Nerves.

It hath nerves from the *plexus retiformis*, or net-like texture, framed of the twigs of *nervus coſtalis* and *ſtomachicus*.

Its uſe.

It ſeemeth to be framed, partly to fill up the vacuity which is between the kidneyes and the *diaphragma*; partly to be a pillow to the ſtomacke, in the place about the emulgent veine and artery.

The proper membrane of the kidneys.

The second membrane is that which is internall and proper. This ſpringeth from the common coat of the veſſels which enter into the Kidneys: for as ſoon as the veſſels approach to the Kidney, they leave their externall coat. It can hardly be ſeparate from the ſubſtance of the Kidney.

Their internall parts.

The internall parts are thoſe which are contained within the proper membrane. In theſe, ſundry things are remarkable.

The colour of them.

Firſt, the colour of the Kidney, which is very red.

Their ſubſtance

Secondly, the ſubſtance of the Kidney, which is thick, hard, and compact as the heart almoſt, but not ſo fibrous.

The emulgent veſſels.

Thirdly, the diſperſion of the emulgent veſſels throughout it; firſt, they enter by paires into the hollow part of the Kidney; then each branch is divided into four or five leſſer branches, and theſe again into leſſer, until at the laſt they become capillar.

Theſe being ſpred ſundry wayes

thorow the ſubſtance of the kidney, towards the gibbons part, at laſt they end at the tops of the *Caruncula papillares*, or teat-like fleſhy ſubſtances, into the which they pour the ſeroſity of the blood, that it may paſſe thorow the *tubuli*, or water pipes, to the *infundibulum.*

The fourth is that which is called *pelvis*, or *infundibulum*, the tunnel, which is nothing elſe but the ample cavity of the ureter within the kidney.

Fifthly, the *tibuli*, or *fiſtulæ ureterum*, the water pipes of the ureters offer themſelves, which are moſt commonly in number ten; foure in each end, two being ſtill joyned together, and two in the middle, according to the number of the *carunculi papillares.* Theſe are placed in the arched part of the *infundibulum.* Now the ends of the pipes about the *infundibulum* are called *cribrum*, or, the ſieve. Theſe water pipes, proceeding from the *infundibulum*, become a little wider, and end in the gibbous part of the kidney, with a wide round mouth receiving the *carunculæ papillares*, by the which their mouths are ſtopped, and the watriſhneſſe of the blood iſſueth out into them, as milk our of the teats.

Sixthly, *Carunculæ papillares* are to be conſidered. They are ſmall fleſhy bodies, ſomewhat harder than the ſubſtance of the kidney, reſembling the teats of womens paps, from whence they have their denomination; they are of the bigneſſe of a peaſe, ſomewhat broad above, below round, If you divide them through the middle, you ſhall perceive a ſmooth hairelike paſſage from the top to the end.

They are in number anſwerable to the number of the *tubuli*, which receive them.

How theſe parts are to be found out.

To find out theſe parts before named, you muſt divide the kidney in the hollow part, putting a thick probe into the *pelvis*.

Incision being made to the *in-*

fundibulum, firſt you ſhall ſee the *tubuli*, then the *Carunculæ papillares*.

The kidneyes have two ſorts of veines.

Their Veins.

Firſt, the two called *adipoſæ*, becauſe they are ſpred through the *tunica adipoſa*, and are covered with the fat, and afford matter for the fat. The right of theſe ſpringeth from the emulgent veine; but the left from the *vena cava*.

Secondly, the two *emulgentes*, ſo called from their action. Theſe are large, and ſpring from the trunck of the *vena cava*, deſcending between the firſt and ſecond *vertebra* of the loynes. Theſe being carried tranſverſly, are implanted into the hollow part of the kidneyes, being divided into two branches.

The left is ſomewhat higher, as alſo the left kidney; but the right is ſomewhat longer. It hath a valve to hinder the return of the feroſity to the trunck of the *cava*.

How matters gathered in the cavity of the breſt are diſcharged into the Ureters.

Fallopius was of this mind, that a branch of a veine paſſeth from the the *vena ſine pari* to the left kidney, by the which quittour and water may be diſcharged by urine. But it is more probable, that theſe matters are firſt drwne in into the trunck of the *aorta*, by its inconſpicuous pores, and from thence ſent to the kidneyes by the emulgent arteries.

The Arteries.

Theſe are in number two, one in each ſide which accompany the veins to the kidney ſlope-wayes. Whither when they are come, they are divided in two branches, whereof the one is implanted in the lower, the other in the upper part of the hollow part of the kidney.

The nerves.

The nerves on each ſide ſpring either from *ramus ſtomachichus*, and that is but one and ſmall, and is ſpread thorow the proper coat; from hence ariſeth the conſent betweene the kidneyes and the ſtomacke. So that vomiting is troubleſome in nephriticall diſeaſes.

One may think that nature hath afforded arteries larger than was requiſite to afford life to ſo ſmall bodies as the kidneys are; but it was fit ſo to be; for the paſſages were to be patent, which were to diſcharge the heart and arteries of ſeroſity.

The place of the arterie.

The artery lyeth between the veine and the ureter; partly to haſten the blood to the Kidney; partly, ſpeedily to diſcharge the watriſhneſs.

The veins and arteries are not joyned with the water-pipes; for if you put a catheter into the ureter, by blowing the veſſel will not ſwell.

CAP. XVIII.

Of the Ureters.

THe Ureters, in Latin *Meatus Urinarii*, are called in Greek οὐρητῆρες, either from οὐρέειν, to piſs, or ὅτι οὖρον τηρέουσι, becauſe they keep the urine.

Their number. There is one in each ſide.

Their ſubſtance. There are white veſſels, like to veines, yet they are whiter, thicker, and more nervous. They reach from the kidney to the bladder.

Their coats. They have two coats, the one common, from the *peritonæum*; the other proper, from the externall or common coat; it hath capillar veins and arteries.

Its fibres. It hath few oblique fibres, but moſt ſtraight. It ſpringeth from the bladder, for it cannot be ſevered from it eaſily, as from the kidneyes.

How the Ureter differeth from the Bladder. Yet it differeth from the bladder in two things.

Firſt, in that the bladder hath three coats, but it only two.

Secondly, the bladder hath all ſorts of fibres, but the ureter hath moſt ſtraight, few oblique.

They are inſerted in the backe and lower part of the bladder, not farre from the muſcle ſphincter, betweene the two proper coats of it, about the length of an inch: This

Why the inſertion is oblique.

This inſertion is oblique to hinder the regurgitation of the urine, when the bladder is either compreſſed or diſtended with urine. Although the ureter doth not ordinarily exceed in compaſſe a barley corne, yet when ſtones doe paſſe, it becommeth ſometimes as large as a gut.

Cap. XIX.

Of the Bladder.

Its place.

The bladder is ſeated in the *hypogaſtrium*, in the place called *pelvis.*

Its ſubſtance.

Of ſubſtance it is membranous, becauſe it was to admit large ſtretching.

Its membranes.

The membranes of it are three. The firſt is from the *peritonæum*; for it is lapped within the reduplication of it.

The ſecond is thicker, and endued with many ſtraight fibres, which *Aquapendens* will have to be a muſcle ſerving for the compreſſion of the bladder, as the ſphincter ſerveth for conſtriction.

The third and innermoſt is white and bright, of exquiſite ſenſe, as they can witneſſe who are troubled with the ſtone.

Its fibres

It hath all ſorts of fibres.

Its cruſt.

Within it is covered with a mucous cruſt, an excrement of the third concoction of the bladder. This doth mitigate the acrimony of the Urine.

Its perforation.

It is perforate in three parts, to wit, in the ſides, where the ureters are to let in the urine, and before to let out the urine.

Its parts.

The bladder hath two parts, to wit, the bottome and the neck.

Its figure.

Both theſe in figure repreſent a peare.

How it is upholden.

The bottome is upholden by the navell: Firſt, in the middle by the ligament called *urachus*, which is the cauſe ſometimes, that they who have a great ſtone in the bladder, complain of great paine about the navell.

Secondly. by the umbilicall arteries dried laterally.

Why mans bladder is ſuſpended.

If the bladder were not ſuſpended, a man going ſtraight up, the bottome of the bladder would compreſſe the neck, and cauſe difficulty in making water.

Its ſeat in Man and Woman.

In man it lieth between the *os pubis* and the *inteſtinum rectum.* In women between the neck of the matrix and *os pubis.*

How the bladder of Man differeth from the bladder of beaſts.

The bladder of man differeth from the bladder of beaſts in two things. Firſt, the bladder in man is couched within the reduplication of the *peritonæum*, but in beaſts it is looſe, and only is tied to the *inteſtinum rectum.*

Secondly, the bladder of man hath fat without, but the baldder of beaſts none.

Why ſtones are ingendred in it.

In it ſtones are promptly engendered, becauſe the heat of it is compact: ſo red hot iron burneth worſe than the flame of fire.

Why there is a conſent between the bladder and kidneys.

There is a great conſent between the bladder and kidneyes. So that in diſeaſes of the kidneyes, difficulty in making water ſometimes happeneth. The cauſes of this conſent are two.

Firſt, the communion of office; for both ſerve for the excretion of urine.

Secondly, the ſimilitude of ſubſtance; for both the inſide of the kidneyes and the bladder are membranous.

An Obſervation

One thing is to be noted, that a bladder is beſtowed onely upon ſuch creatures as have bloody lungs, and the hotter the lungs are, the bigger the bladder is.

Why the bladder in man is big.

So man, according to his ſtature, hath of all living creatures the biggeſt bladder; according to *Ariſt. lib.*1. *Hiſtor. Animall.* Becauſe the bladder is of a cold temperature, therefore in deadly diſeaſes of it, ſleepineſſe oppreſſeth the Patient, according to *Hippocrates*, 6. *Epidem.*

The muſcle ſphincter

In the necke onely the muſcle *ſphincter* doth offer it ſelf to be conſidered: whereof read in the doctrine of muſcles.

It

Its veſſels.

It hath veines and arteries called *Hipogaſtricæ*, implanted on every ſide of the neck, which are immediately divided into two branches; whereof the one is beſtowed upon the bottome, but the other upon the neck.

Its nervs.

It hath remarkable nerves; partly from thoſe of the ſixth conjugation, which paſſe by the roots of the ribs, partly from thoſe which ſpring laſt from the *os ſacrum.*

Its uſe.

The uſe of the bladder is to containe the urine, like a chamber-pot, untill the time of excretion come, when the bladder is full.

CAP. XX.

Of the generation of blood.

FIrſt of all, every nouriſhment receiveth a preparation in the mouth. If it bee ſolid, it is chewed by the teeth, from the mouth by ſwallowing, it is turned to the ſtomack.

How the *Chylus* is made.

mack. It being embraced by the ſtomack, and kept for a while is turned into *chylus*, partly by the ſpecificall heat of the ſtomack it ſelfe; partly by the heat of the adjacent parts; but chiefly of the liver, ſpleen, and caul.

The *chylus* being made light by concoction, it riſeth up, and paſſeth to the *pylorus*, and procureth the opening of it. This being opened, the ſtomack by its tranſverſe fibres, thruſteth the *chylus* into the *duodenum*. From hence it paſſeth more and more downewards by degrees. The wrinkles of the ſmall guts hinder the ſudden paſſage of it to procure an equall concoction of all the parts of it.

In the meane time the *venæ lacteæ* draw from the ſmall guts, whatſoever is alimentary of the *chylus*. While the *chylus* thus paſſeth to the liver, and is come to the divarication of the *vena portæ*, the ſpleen by a naturall faculty by the *ramus ſplenicus*, draweth to it ſelfe the thickeſt and moſt terreſtriall part, yet the pureſt onely may come to the liver.

When the *chylus* is come to the liver,the choler is ſent either by *meatus cyſticus,* to the gall,or to the *jejunum*, by *meatus hepaticus*.

The bloud being perfected, the groſſer part is carried by the branches of the *vena porta*, and the ſplenicall to the nouriſhment of the parts appointed for nutrition; but the pureſt part is carried to all other parts for their nutririon: and becauſe much watriſhneſſe is mingled with the bloud, that it may paſſe without difficulty, by the narrow paſſages of inoſculations, to the *vena cava*, (ſeeing the ſeroſity is unapt to nouriſh) it is ſent by the emulgent veins and arteries to the kidneys, and from thence by the ureters to the bladder.

CHAP.

CAP XXI.

Of *vaſa præparantia in Man.*

HItherto wee have handled the parts appointed for nutrition. Now it followeth to run thorow the parts ordained for generation to continue man-kind.

The differences of the genitals.

The genitals are of two ſorts; of the male and female; and ſo it was requiſite for procreation; for this action requireth an agent and patient: ſeed and menſtruall blood.

The firſt is the palace of the plaſmatick ſpirit. The ſecond affordeth ſupply of matter to the ſpirit, to draw out the admirable frame of the regions and parts of the little world.

The parts of the genitals in man.

In man ſome of theſe parts afford matter for the ſeed, to wit, the foure *vaſa præparantia*: ſome elaborate this matter, as the *corpus varicoſum*: ſome make the ſeed fruitfull, as the ſtones; ſome carry the ſeed back againe, and make it pure, as thoſe which are called *vaſa deferentia*:ſome containe the ſeed,and an oleaginous matter,as the *veſiculæ ſeminales*, and the *proſtates*; ſome diſcharge the ſeed into the matrix: this is done by the *penis*.

Vaſa præparantia.

Vaſa præparantia, which prepare matter for the ſeed, are of two ſorts, veins and arteries.

The veins are two. The right ſpringeth from the trunck of the *vena cava*, a little under the emulgent.

The left proceedeth from the emulgent.

The Arteries.

The arteries ſpring from the trunck of the *aorta*; theſe veſſels being a little diſtant one from another, are tied together by a thin membrane, which ſpringeth from the *peritonæum*, and meet often by the way by inoſculation. Theſe veſſels are greater in men than in women, and the arteries are bigger than the veins; becauſe much heat and plenty of ſpirits are required for the ſeed. They emter into the groyne obliquely, carried together with the muſcle cremaſter, between the two coats of the *peritonæum*.

In curing of a rupture by inciſion, if the muſcle cremaſter doe fall out to bee bound by the ligature, *Spaſmus cynicus* enſueth.

The ending of the veſſels.

Theſe veſſels doe end about the beginning of the teſticles, and from hence are called ἐπιδιδύμιδες, and make up that part which is called *corpus varicoſum*, *paraſtata*, & *plexus pampiniformis*. From the ſtones to it many ſmall fibres paſſe.

Corpus varicoſum

The *corpus varicoſum* is framed of the twiſting of the *vaſa præparantia*; which maketh a long, thick, *glaudulous*, but hard welt, without any remarkable cavity, which paſſeth to the bottom of the ſtone, and from thence to the *vas differens*, where it endeth.

Here the venall and arteriall blood being elaborate in theſe admirable windings, is further prepared,

pared, a quality being imparted from the ſeminificall faculty of the ſto nes.

Cap. XXII.

Of the ſtones.

THe ſtones in Latine are called *Teſtes*, becauſe they teſtifie one to be a man.

Their ſubſtance

They are glaudulous bodies, flaggie, ſoft, and white, without any cavity, full of ſmall veins and arteries, ſuch as are not in any part of the body.

Their number.

They are in number two and therefore in Greeke are called δίδυμοι.

Their figure.

Their figure is ovall, the right is hotter, and better concocteth the ſeed: Wherefore by *Hippocrat.* it is called ἀῤῥέγονος, a begetter of the male.

The left ſtone is more full, and hath a bigger veine; yet the ſeed, which is there elaborate, is more wateriſh, watriſh, and colder, becauſe it proceedeth from the emulgent, and and is called of *Hippoc.* θηλύγονος, becauſe it begetteth the female. In the ſtones there are to bee conſidered their coats, ſubſtance, and uſe.

Their coats.

Their coats are foure.

Firſt, *burſa ſcroti*, and it is nothing elſe but the skin covered with the *cuticula*: And becauſe it cleaveth firmly to the *Membrana carnoſa* under it, ſo that they ſeem to make but one coat, it commeth to paſſe that in cold it doth contract it ſelfe, and becommeth wrinckled.

The line

In the lower part it hath a line, according to the length, whereby it is divided into the right and left ſide; this line is called *ſutura*, or a ſeame.

Secondly, it is called by *Rufus*, *dartos*: becauſe it may eaſily bee flead from the *tunica vaginalis*: by the Ancients it was called *erithroides*, becauſe it appeareth to be red, by reaſon of the fleſhy fibres, where wherewith it is enterlaced.

This ariſeth from the *membrana carnoſa*; which here is more thin and ſubtile than elſe where, and ſtored with veins and arteries.

The third is *elythroides*, or *vaginalis*; becauſe it containes the ſtone as a ſheath. It is a thicke and ſtrong membrane, having many veines. In the outſide it is uneven, by reaſon of the fibres by the which it is tied to the *dartos*; but in the inner ſide it is ſmooth. This is nothing elſe but the production of the *peritonæum*.

The fourth is ὑμὴν νευρώδης the nervous membrane, called *albuginea*, from its colour. It is white, thick, and ſtrong, framed of the externall tunicle of the *vaſa præparantia*. It is immediately wrapped in the ſtone; betweene theſe two the water is contained in *Hernia aquoſa*.

The ſubſtance is deſcribed in the beginning of the Chapter. Each ſtone hath one muſcle called *cremaſter*, from κρεμάω, or κρεμάζω,

which

is to hold up; becauſe it pulleth up the ſtone in the act of generation, that the veſſels, being ſlacked, may the more readily voyd the ſeed.

This muſcle is nothing elſe but the lower part of the oblique muſcle, aſcending neere to *os pubis*, which outwardly wrapping the production of the *peritonæum*, is carried to the ſtone.

Theſe muſcles in ſickneſſe and old age become flaggy, and ſo the *ſcrotum* relaxeth it ſelfe, and the ſtones hang low.

The uſes of the ſtones are three:

The firſt is to elaborate the ſeed by reaſon of the ſeminificall faculty reſident in the *parenchyma* of the ſtones; for they turne the blood, which is brought by the *vaſa præparantia*, into ſeed, for the moſt part; the reſt they reſerve for their own nutrition.

The ſecond is, they add heat, ſtrength and courage, to the body, as gelding doth manifeſt, by the which all theſe are empaired.

Thirdly, they receive the ſuperfuous humidity of the ſeed, by reaſon of their glandulous ſubſtance.

CAP. XXIII.

Of the Veſſels that carry the ſeed, and thoſe that keep it.

V*Aſa deferentia*, the veſſels which carry the ſeed; in colour they are white; in ſubſtance ſinewy, having an obſcure hollowneſs; from hence they are called *Meatus ſeminales*. They ſpring from the lower end of the *paraſtatæ*. Theſe mount up by the ſides of the *Vaſa præparantia*

When they are come within the cavity of the belly, they turn back again, and paſs to the backſide of the Bladder; betweene which, and the *Inteſtinum rectum* they paſs, untill about the neck of the bladder, being ſomewhat ſevered, and at laſt being joyned together, but not united, are inſerted on each ſide in the glandulous bodies called *proſtatæ*.

Veſicula ſeminalis.

Before they come thither they are joyned to the *Veſicula ſeminalis*. Theſe in figure repreſent the cels of a Pomegranat, or honycomb.

Their ſubſtance

Theſe containe an oily and yellow ſubſtance, for they draw unto themſelves that which is fatty in the ſeed.

They are more in number, that the oleous ſubſtance ſhould not forcibly and plentifully be poured into the *urethra*, but ſhould gently and ſlowly paſſe from one unto an other by windings, and at laſt be poured into the conduit of the yard by a hole which is ſhut up with a fleſhly ſubſtance, partly to ſtay the involuntary effuſion of it, partly to hinder the regurgitation of it. It being poured into the *urethra* chiefly in the time of carnall copulation, doth moiſten it that it ſhrink not, and ſuffereth it not it to be offended by the acrimony of the ſeed or urine. The *Vaſa*

Vaſa deferentia paſſing by theſe, goe to the glandules called *proſtatæ*, by the which they are compaſſed.

The uſe of the caruncle in the Urethra

When they are come to the *urethra*, a caruncle as a valve, is ſet before the orifice of each of them; partly to hinder the comming of the urine into them, partly to hinder the involuntary effuſion of the ſeed.

The holes by which the ſeed paſſeth to the Urethra.

Under and by this caruncle on each ſide there are three holes, thorow which the ſeed paſſeth into the urethra. Theſe holes are diſcerned eaſily in a gonorrhea inveterate, although not ſo eaſily in a ſound perſon.

The ſeed doth paſſe thorow theſe inconſpicuous paſſages, as quickſilver thorow lether, by drops. The ſeed having been made ſubtil and ſpirituous by ſublimation thorow the *Vaſa deferentia* aſcending, is able to paſſe thorow inconſpicuous paſſages.

Proſtatæ

Proſtatæ, or *glandulæ ſeminales*, are glandulous bodies, placed between the neck of the bladder, and the *inteſtinum rectum.* Although there is no conſpicuous paſſage by the which the ſeed paſſeth into the urethra; yet the thick membrane which wrappeth in the proſtate, where it leaneth upon the urethra, is thinner, and hath many pores; which are dilated bv heat in the act of generation, and may be ſeen in an inveterate *gonorrhea.*

A continuall dilatation of theſe procures an uncurable *gonorrhea.*

The ſphincter of the bladder compaſſeth theſe glandules. In drawing of a ſtone, if theſe parts be torne, the party becommeth barren.

Perinæum

The diſtance between the root of the *cod* and the *podex* is called *perinæum*, becauſe it is ſtill moiſt with ſweat. The *pubes, ſcrotum, &* *perinæum* in men, are furniſhed with haire, becauſe glandules are placed there, which receive plenty of ſuperfluous moiſture: a part whereof

Why theſe parts in men are hairy.

Their beginning.

Theſe two laterall ligaments, where they are thick and round, ſpring from the lower part of the Share-bone. In their beginnings they are ſeparate one from another, and repreſent the two horns of *Pytnagoras* his Y, that the *Urethra* may paſs between them.

Septum lucidum.

But as ſoon as they come to the joyning of the ſhare-bone, they are by the *ſeptum lucidum* everted. It is nervous and white.

It ariſeth from the upper part of the commiſſure of the *os pubis*, and upholdeth the two laterall ligaments and the urethra, as a ſtay. The like is found in women to uphold the *cunnus*. Under theſe lieth the urethra.

The *urethra.*

It is of a ſubſtance nervous, thick, looſe, and ſoft, like to that of the laterall ligaments. It beginneth at the neck of the bladder, yet it doth not ſpring from it, but is joyned to it only, and ſo paſſeth to the glans. If you boile the bladder and it, it will ſeparate it ſelfe from the bladder.

Its frame

It is framed of two membranes, the one is internall, with the which the glans is covered; it is bred of the thin membrane which covereth the nerves of the prick. It is of an exquiſite feeling, that it might feel the acrimony of the ſeed, and cauſe pleaſure; chiefly in that part of it which lieth between the proſtates.

The externall is fleſhy, and hath many fleſhy tranſverſe fibres. The middle ſubſtance is fungous, and full of black blood, that it might ſuffer diſtention and relaxation with the laterall ligaments.

At the beginning of it there are three holes, one in the middle largeſt, and two leſſer, in each ſide one, from the paſſage which is ſent from *veſiculæ ſeminales* to the urethra.

Its muſcles.

The muſcles are two in each ſide and ſo foure in all. Of theſe collaterall muſcles, the one is ſhorter and thicker, and ſpringeth from the *appendix*, or knob of the *coxendix*; under the beginning of the laterall ligament, and aſcending obliquely, is inſerted into the ſame, a little below the begining of it; this ſerveth for erection.

The ſecond is longer and ſmaller, proceeding from the ſphincter of the *anus* fleſhy.

This paſſeth ſtraight under the urethra, and is inſerted about the middle of it, in the ſide of the prick. Theſe two muſcles dilate the lower part of the urethra for miction and ejaculation of the ſeed. As the firſt muſcle is termed *erector*, ſo this is called *accelerator*, or haſtener.

This harh a ſubſtance agreeable with that of the *penis*; for this in erection is drawne towards its beginning, and the erection ceaſing, it becommeth lank.

Glans is the extreme part; it is ſomewhat round, compaſſed with a circle, as with a Garland. It is ſoft, and of an exquiſite feeling, by reaſon of the thin skin, with the which it is covered. About the root of it: where it is joyned with the nervous bodies there is a little pit: In the which if any ſharp humour be lodged, as in *gonorrhæa virulenta*, great paine is cauſed.

Præputium. The Glans is covered with *præputium*, the fore skin; it is framed of the reduplication of the skin.

Frænum. The ligament by the which it is tyed to the glans in the lower part of it, is called *frænum*, the bridle.

The veſſels. Of the veſſels, ſome are cutaneous, ſome paſſe to the inner parts of *penis*.

The *Cutaneus* veines and arteries ſpring from the *pudenda*; theſe entering at the root of the prick, they paſſe by the ſides towards the back of it, and are conſpicuous enough. The veſſels which beſtowed upon the inner parts of *penis*, come from the *Venæ* and *arteriæ hypogaſtricæ*, about the roots of the laterall ligaments. Here the arteries are remarkable, which are wonderfully diſperſed through the body of the *penis*: for the right artery is beſtowed upon the left ſide, and the left upon the right ſide.

It hath two ſinews from the *Os ſacrum*. The leſſer is beſtowed upon the skin; the largeſt mounting up under the ſhare bones to the root of the yard, between the laterall ligaments; it is beſtowed upon the muſcles, the reſt of the body of the *Penis* and the Glans.

Its ſinews.

Of the GENITALS in Women.

CAP. XXV.

Of the Cunnus.

THe Genitals in a Woman have four diſtinct parts; to wit, the *Cunnus*, the Matrix, the ſtones, and the ſpermatick veſſels.

Cunnus is that part which offereth it ſelf to the ſight before ſection. In it eleven particles are remarkable.

The particles of the *Cunnus*.

1. *Pubes*, that particle where

the hair doth firſt bud out; which ordinarily falleth out the fourteenth yeer of a womans age; the upper part of this which buncheth out, and is moſt hairy, is called *Veneris mons.*

2 Is *Rima magna*, the great chink; it beginneth at the *os pubis*, and is but an inch diſtant from the *anus*. Wherefore it is larger then the cavity of the neck.

3 The *Labia* or lips; by theſe the internal parts are covered, as the tongue and teeth by the lips. Theſe are framed of the common integuments of the body, theſe have pretty ſtore of ſpongious fat.

4 Are the *Alæ*, or *Nymphæ*, the wings; theſe appear when the lips are ſevered: Theſe are two productions framed of a ſoft and ſpongious fleſh, & the reduplication of the *Cutis*, placed at the ſide of the neck: Being joyned above, they compaſs the *Clitoris*. In figure and colour they reſemble the comb of a Cock.

5 Is *Clytoris*, this is a nervous

and hard body: within, full of a black and ſpungious matter, as the lateral ligaments of the yard. It is framed of three bodies. The two lateral are ligaments, and ſpring from the internal knob of the *Iſchium.* The third is between theſe; this ariſeth from the joyning of the *os pubis*; at the end of it is the glans, which hath a ſuperficial hollowneſs, and is covered with a very thin skin, as a *Præputium*, which ſpringeth from the joyning of the *Nymphæ.* And as it doth repreſent the prick of a man, ſo it ſuffereth erection, and falling; it may be called a womans prick. In ſome women it hath been as big as a mans.

6 Under the *Clytoris* above the neck, a hole is to be ſeen, by the which a woman maketh water.

7 After the *Nymphæ* four caruncules, reſembilng the leafe of the mirtle ſhrub, are to be ſeen: Whereof that which is uppermoſt, is largeſt and forked, that it might receive the end of the neck of the

bladder, the other is below: The other are on the ſides. All foure keepe back the ayre, and all other things, from entring into the cavity of the neck, and by tickling the genital of man cauſe the greater delight. In women which have not borne children, they are moſt conſpicuous.

Theſe caruncles are framed of the reduplication of the fleſhy neck of the genital.

8 Behinde the caruncles appeareth a cavity in the lower part of the neck of a reaſonable largeneſſe, framed by nature to ſtay the ſeed poured into the neck from too quick ſlipping out.

9 In Virgins theſe caruncles are joyned together by a thin and ſinewy membrane interlaced with ſmall veines, cleaving orbicularly to the ſides of the neck, having a ſmall hollowneſſe in the middle, which will receive a peaſe, by the which the menſtruall blood paſſeth: Sometimes it is hollow like a ſive, it is called *hymen*.

10 Behinde theſe caruncles and the *hymen* appeareth a chink, under the orifice of the bladder betweene the two wings, which is the entrance into the neck.

The neck.

11 Now the neck is nothing elſe but that diſtance, which is between the *Cunnus*, and the mouth of the matrix.

Its length.

In women of an ordinary ſtature, it is eight inches in length.

Its ſubſtance.

The ſudſtance of this part is hard, without fleſhy, within membranous and wrinckled, like to the inner skin of the upper jaw of a cowes mouth.

Firſt, to cauſe greater pleaſure in the act of generation.

Secondly, the better to retaine the ſeed.

Thirdly, to admit the greater dilatation in travell.

Its ſeat.

The neck is ſeated in that cavity of *hypogaſtrium*, which is called *pelvis*, betweene the bladder and *inteſtinum rectum*. It hath two membranes; if you cut them tranſverſly, you ſhall perceive between them a ſpongious fleſh: ſuch as is found in the lateral ligaments of the *Penis*. This cauſeth it to ſwell in the act of generation, innumerable ſprigs of veines and arteries affording plenty of ſpirits.

Its veſſels. The hypogaſtrical veines are inſerted into the neck of the Matrix: from thence paſſing to the mouth of the Matrix. As ſoon as they come to be implanted into the ſubſtance of the *uterus*; they loſe their own coats, which are beſtowed upon the firſt membrane of it. From thence by ſmall pipes (ſuch as are found in ſponges, but wreathed) blood is carried to the Matrix: by theſe veines the termes iſſue into the neck of the genital.

A large branch paſſeth from *arteria hypogaſtrica* to the neck. A ſprig of it, but wreathed, is communicate to the teſticle, paſſing thither between the two membranes of the body of the Matrix: This ſprig is winded to hinder it from ruption, when the Matrix is enlarged, a woman being with child.

CAP. XXVI.
Of the Matrix.

THe matrix was appointed by Nature tō be the field of Nature, to receive the ſeeds of man and woman, for the procreation of man, and the continuation of mankinde.

The parts of it.

It hath two parts, *os uteri*, the mouth of the Matrix, and *fundus* the bottom.

The mouth of it.

The mouth is a hole at the entrance of it, which like a mouth may be dilated, or purſed in: this entrance is but a tranſverſe line, which when it is exactly opened becometh round.

This orfice, although in the act of generation it may be ſo dilated, that it will receive the glans of a mans genital; yet after conception it is ſo cloſely ſhut, that it will not admit the point of a bodkin; when a woman is delivered it ſo openeth it ſelfe, that it maketh way for the infant, be it never ſo big. In thoſe who have beene mothers, it is like to the mouth of a whelpe. The cancer of the matrix moſt commonly beginneth here, becauſe it is ſomewhat fleſhy: within this orifice a long knobby ſubſtance is placed, to helpe the ſhutting of the orifice the more exquiſitly. About this knobby ſubſtance, ſmall holes are to be ſeen, which ſeem to be the ends of the ejaculatory veſſels.

Its figure

In figure it is like a peare or a cupping glaſſe.

Its bigneſſe.

In virgins even of big ſtature it exceedeth not the bigneſs of a walnut; But in thoſe who are with child, it doth dilate it ſelfe into that capacity, as is able to containe the child.

Why it is ſmall.

It was to be ſmall, becauſe the ſeed in quantity is but little, which it ought to embrace and cheriſh.

No diſtinct cels in it.

It hath no diſtinct cels, as the matrix of a beaſt hath; only a line, as in the tongue and cod, doth ſeparate the right ſide from the left. In length from the orifice to the extremity of the bottome,it is thought to be three inches.

The internall ſuperficies is rough the better to keepe the ſeed.

Its frame

The matrix is framed of two membranes; the externall ſpringeth from the *peritonæum*, and is the thickeſt of all other that ſpring from it. It is ſmooth and ſlippery if you except thoſe parts where the ſpermatick veſſels enter into the matrix, and where the ligaments goe out. The internall membrane is full of ſmall holes, where the matrix covereth the *inteſtinum rectum*.

When the courſes flow, they are eaſily ſeen; but not when they ceaſe. The Ancients did take theſe to be the mouths of the veines and arteries.

Acetabula.

And becauſe they reſemble in figure the meaſure appointed for the ſelling of vinegar, they called them *Acetabulæ* or *Cotyledones*. By theſe holes the menſtruall blood iſſueth.

Cornua uteri.

Above at the ſides of the externall membrane two little bunches, ſuch as are ſeen in Stirks or Heifers, when the hornes begin to bud are to be marked. They are called *cornua uteri.*

Its veſſels.

For nouriſhment it hath both veins and arteries.

The Veins.

Of theſe the veins are bigger than the arteries: the veines ſpring from two branches on each ſide: one branch commeth from the *vaſa præparantia*: this doth deſcend, and is ſpread thorow the whole matrix: but chiefly thorow the bottome: and ſeeing the ſprigs are implanted in each ſide, the right are coupled with the left by inoſculation.

The other branch, which commeth from *ramus hypogaſtricus*, doth aſcend from the lower parts, and is ſent partly to the orifice, partly to the bottome. Theſe are larger than thoſe which ſpring from the *vas præparans.* Both theſe being diſperſed thorow the ſubſtance of the matrix are united by inoſculation alſo.

Some will have the menſtrual

blood to flow from the twigs ſent from *Ramus hypogaſtricus* when a woman is with childe: being perſwaded by the *Aphoriſme* of *Hippocrates lib.*5. *Aphor.*51. that nothing can flow from the cavity, the orifice being ſo ſhut that it cannot admit the point of a bodkin; but the word συμμέμυκεν, ſignifieth only *conivens*, or ſhut together, as the eye lids are. And although in the firſt moneths the orifice be exactly cloſed; yet when a woman is great with childe, the orifice gapeth a little, and is ſhut with a mucous ſeminall ſubſtance, which doth repell the aire, and lubricate the orifice in the delivery.

Its arteries.

It hath arteries alſo, which ſpring from the preparing arteries, and from the *hypogaſtricæ*, as the veines did; theſe accompany the veines, and are diſtributed as they are.

The ſinews.

The ſinews firſt doe ſpring from the ſixth conjugation: they are ſmall, and are beſtowed upon the bottome: than from the parts which ſpring from the *os ſacrum*.

Theſe are beſtowed partly upon the lower part of it, and partly upon the *Cunnus*. Theſe are larger, becauſe in the act of generation great delectation is required.

By theſe veſſels, arteries, veines, and nerves, the matrix hath a conſent with all the reſt of the body. And although the veines and arteries ſeeme to be ſmall in women which are not with childe: yet in thoſe who are with child, by the affluxion of blood, they will ſometimes become as thick as a finger. Yea, in ſuch the matrix, which otherwaies is membranous, as hath beene ſaid, becommeth in the laſt moneths thicker and ſofter; ſo that about the upper part of the bottome, unto the which the *placenta uteri* is tyed, it becommeth almoſt two inches thick.

The matrix is onely tyed to the adjacent parts laterally: for above, fore, and after, it is free; that it might admit dilatation,and deſcend or aſcend in the act of generation.

Its ligaments.

Now the ligaments are in number four: The two uppermoſt, broad and membranous, are nothing elſe but productions of the *peritonæum*, which tie the matrix to the *oſſa ilii*.

They are looſe and ſoft, that they might admit dilatation with the matrix, when a woman is with childe; and conſtriction when ſhe is not.

Theſe carry the *vaſa præparantia* and *deferentia* to the matrix,and lap up the ſtones: they repreſent the wings of a bat, or the ſailes of a ſhip ſpread abroad. Theſe keep the matrix ſteady in its own place,that it neither aſcend nor deſcend.

The two lower ligaments are nervous, round, and hollow; they ſpring from the ſides of the bottom of the matrix, neer to the *vaſa deferentia*, which they touch; they goe downe to the groynes, by the production of the *peritonæum*, ſtrengthened by the glandules: and being dilated like a membrane, they beſtow one part upon the *clytoris*: the reſidue paſſeth to the knee, in the inſide of the thigh by the *membrana adipoſa*: this is the cauſe why women after conception feele paine in the inſide of the thigh.

Theſe ligaments ſerve not only to ſtay the matrix, but becauſe they are hollow, by them noyſome humors of the genitals are ſent to the glandules of the groynes. So after impure copulation, the ſeminary veſſels being infected, the contagious humor, by theſe ligaments is ſent to the groynes; from whence ariſe *bubones venerei*.

Cap. XXVII.

Of the ſtones, and the ſeminary veſſels.

WOmen have ſtones as men have; but they differ in eleven things.

The differences between the ſtones of a woman and of a man.

1 In ſituation; for they are placed not without the *hypogaſtrium*, as in men; but within it: that they might bee the hotter and more fruitfull.

2 In quantity; for they are leſſer.

3 In their frame; for they are compoſed of five or ſixe bladders, which make them uneven; whereas the ſtones of men are ſmooth: theſe bladders containe an humidity like to whey; but it is thicker.

4 The ſtones of women have no *cremaſters*; but ate ſtayed by the broad laterall ligaments, called the bats wings.

5 They have no *proſtates.*

6 They differ in figure; for in man they are ovall, but in women flattiſh.

7 They have but one membrane; whereas mens have foure.

8 In ſubſtance; for they are more ſoft and flaggie than in men.

9 Intemperature; ; for they are more cold than mans ſtones, and containe a thin and watriſh ſeed.

10 In women they are tyed to the ſides of the *uterus*, by the two upper ligaments, which are looſe and membranous.

11 In women which are not with childe, they are placed above the matrix, two inches diſtant from it.

Its veins

The ſeminary veſſels preparing, are foure; two veins, and ſo many arteries.

The vein of the right ſide ſpringeth as in man, from the trunck of the *vena cava* under the emulgent; but that of the left ſide ſpringeth from the middle of the emulgent of the ſame ſide.

Its arteries.

Both the arteries ſpring from the deſcending trunck of the great artery. Theſe veines are not united as in man, before they come to the ſtones, bnt are divided into two branches. Wherof the greater being ſtayed by the membranous ligament, is carried to the ſtone; but the leſſer endeth in the bottome of the matrix in the upper part, for the nutrition of the matrix, and the *embryo.*

The difference between theſe and thoſe in men.

Theſe *vaſa præparantia* differ from thoſe in men in theſe things.

Firſt, they are ſhorter than in men, by reaſon of the ſhortneſſe of the paſſage; but they have more wreathings where they make *corpus varicoſum*, about the ſtone, that the ſeed may be the better prepared.

Secondly, they paſſe not whole to the ſtones as in men; but are divided in the mid way, as hath been ſaid.

An obſervation

One thing is to be noted, that the ſpermatick veins receive the arteries as they paſſe by the ſides of the *uterus*, that the blood might be the better elaborate; for if you blow up the *vena ſpermatica*, both the right and left veſſels of the matrix are blowne up. From hence you may perceive the communion of all the veſſels of the matrix.

Vaſa deferentia. The *Vaſa deferentia* ſpring from the lower part of the ſtones. They are firm, white, and nervous. They paſs by the membranous ligament to the matrix, not ſtraight, but wreathed; that the ſhortneſs of the way might be recompenſed with the multitude of windings. Neer the ſtones they are ſomewhat broad: When they have marched a little, they become narrow, and about the matrix they become broad again, and end in the *cornua* and capacity of it. Amongſt theſe veſſels, the laſt to be conſidered is *Tuba Fallopiana.* *Tuba Fallopiana.* *Spigelius* calleth it *Vas cœcum, lib.* 8. *cap.* 20. becauſe it hath but one orifice, as the *inteſtinum cœcum* annexed to *colon*; this ſpringeth from the *cornua* or bunches, and reſembleth the end of a trumpet, and paſſeth obliquely, over againſt the ſtone carried by the membranous ligament, and compaſſeth the ſtones: but it neither proceedeth from the ſtones, neither is inſerted into them: And as in its beginning it is open; ſo in its ending it is ſhut.

Riolan will have it to be the end of the ejaculatory veſſel, ending within the matrix. He obſerveth, that within it is to be ſeen a long, white and ſinewy body, which he will have to be the continuation of the ejaculatory veſſel. He noteth alſo, that a ſmal ſprig doth paſs, but wreathed, from the ejaculatory, by the ſides of the *uterus*, to the orifice; by thewhich women with child ſpend their ſeed in the act of generation: which *Spigelius* denied in the citeth place, and checketh *Laurentius* for affirming ſuch a paſſage.

THE SECOND BOOKE; OF THE BREST.

CHAP. I.

Of the common containing parts of it.

Hitherto then of the lower belly, the ſeat of the natural ſpirit, and of the parts appointed for nutrition and procreation: Now it followeth that we handle the middle cavity, the ſeat of the vital ſpirit, which containeth thoſe parts appointed for the cheriſhing of the natural heat, the diſtribution of the ſame to all other parts of the body, and the cooling of it, if it exceed the natural degree.

It ſitu-ation.

This ventricle is ſeated in the middle between the uppermoſt, which is the head, and the lowermoſt which is the belly: for it was fit, that it ſhould be ſo, that the heat paſſing thorow all and beſtowing life, ſhould equally be beſtowed upon all the parts of the body.

Its limitation.

It is ſevered from the head by the neck; from the belly by the mid-riſe. It is bounded in the forepart by the breſt-bone, and cartilages. In the ſides by the ribs: behind by the *vertebræ* of the back.

Its figure

The figure of it is oval, ſomewhat flat before and behind, whereas in beaſts it is ſomewhat ſharp: So that onely man lieth on his back.

Its ſubſtance.

It is partly bony, partly fleſhy, that it might admit motion, and yet not ſtifle the heart; the fleſhy parts being ſuſpended by the bony.

Its parts. The fore part of it is called *ſternum*, the ſides *coſtæ*, and the hinder part *dorſum*. The parts whereof it is compoſed, are either containing or contained. The parts containing are either common or proper.

The common containing parts The parts containing common are in number four, *Cuticula*, *Cutis*, *Pinguedo*, and *Membrana carnoſa*.

1, 2. *Cuticula.* The ſcarſe skin, and skin of it do ſuffer from thoſe in the belly: for it is hairy under the arm-pits, and above the pit of the heart: the skin of the back is both harder and thicker, and ſo is leſs hairy.

Secondly, the skin of the back-part is of an exquiſite feeling: firſt, becauſe many twigs of ſinews are beſtowed upon it from the *Nervis*, proceeding from the *ſpinalis medulla*: ſecondly, by reaſon of the muſcles of the breſt placed there, which have many tendons, and ſo are very ſenſible.

3. *Pinguedo.* As for the fat, it is not plentiful here, as in the belly: firſt, becauſe

cauſe the naturall heat here is ſufficiently preſerved without it: ſecondly, becauſe it would have hindred the motion of the breſt. Onely here it is ſomewhat yellowiſh.

4 The *Membrana carnoſa.*

The *Membrana carnoſa* here in the fore part of the neck is more fleſhy than in other parts, chiefly where the *muſculus quadratus* is framed, which pulleth downe the cheeks and lips.

CAP. II.
Of the Dugs.

The parts of the breſt.

THE proper containing parts are either externall or internall. The externall are in number three, the dugs, the muſcles, the bones. The internall proper containing parts are three in like manner, the *pleura*, the *mediaſtinum*, and the *pericardium*.

The paps of men.

Dugs are granted to both the ſexes; in men they are framed of the *cutis*, the *membrana carnoſa*, fat, far, and the nipple, and ſerve onely for beauty, and are called *mammillæ.*

If in man a whitiſh ſubſtance repreſenting milk, be found in the nipples, which hath beene ſeene, as witneſſeth *Ariſtotel.* 1. *Hiſtor. Animal.* 12. it is unprofitable, and unapt to nouriſh.

The parts of the paps in women.

The paps in women beſides theſe parts, have remarkable veſſels, glandules and pipes, to containe the milke perfected by the glandules.

The glandulous bodies.

The glandules are many, not one; that the milke might be the better elaborated, there is placed above the reſt one ſomewhat bigger under the nipple. Between theſe are placed innumerable veins and arteries, which receive blood from the matrix the materiall cauſe of milk.

When theſe are full of blood, the milk is made by the property of the ſubſtance of the glandulous bodies, and their temperament. The milk prefected is ſent to the *tubuli*

tubuli lactiferi or conduits of milk, these end in the nipple.

The Veins.

The veines are of two ſorts, for ſome are external, ſome internal. The external ſpring from the axillar branch, and are placed under the skin which covereth the dugs, to nouriſh it, and are called *Thoracicæ superiores*, or the uppermoſt breſt veines. The internal or inferiour called *mammariæ*, ſpring from the *rami ſubclavii*: They are in number two, whereof one doth march downward ſtraight by the ſides of the breſt bone. When they are come to the *mucronata cartilago*, they paſs out of the breſt, and go downward by the lower part of the *muſculi recti*. When they are come to the umbilical region almoſt, they are joyned with skin, by ſundry inoſculations, with the *venæ epigaſtricæ*, which meet them there.

Theſe *venæ epigaſtricæ*, ſpring from the external *ramus iliacus*, and by a ſtraight way paſs upward under theſe muſcles. From this ſame branch, ſpring the *venæ hypogaſtricæ*, which are inſerted into the neck and bottom of the Matrix.

The Arteries.

There are *arteriæ mammariæ* in like manner, which ſpring from the *rami ſubclavii*, and get down to the navel. Whither when they are come, they are united by inoſculation with the *Arteriæ epigaſtricæ* aſcending.

Nerves.

They have nerves from the fourth intercoſtal nerve, which about the middle of the rib, perforating the intercoſtal muſcle, is divided into four branches, which are ſent afterward to the pectoral muſcle; the thicker paſſing to the nipple.

The fat.

Between theſe glandulous bodies and veſſels plenty of fat is placed, to procure ſmoothneſs and equality to the paps. If this be waſted either by ſickneſs or old age, the dugs become flaggy.

The figure of the dugs.

The paps are of figure round, both that they ſhould be more capable of milk, and leſs ſubject to bruiſings.

Their number.

In number they are two, that if one ſhould fail, the other ſhould ſupply the defect.

Their ſituation

In Men, women and in Apes, which carry their young ones in their armes, they are ſeated in the breſt.

1. That the mother ſhould take pleaſure by upholding the child.

2. That by the talking of the mother, the child ſhould learn to ſpeak, and be endued with reaſon.

3. That being neer to the heart, they ſhould receive plenty of heat.

4. For beauty.

5. For convenient giving of ſuck; for the child cannot preſently go when it is born, but muſt be born in the armes and applyed to the teat.

6. For the commodity of the act of generation.

7. For the defence of the vital parts.

8. For the incitation of luſt.

9. To be a receptacle of excrementious humour: so women are often troubled with Cancers.

Of the Nipple.

The nipple is placed in the middle of the dug, where the milkie conduits end. It is a round body ſtanding out, that the infant may take hold of it with the lips. It is of a fungous ſubſtance, that it may admit diſtention and contraction. It hath many holes; which appear when the milk is preſſed out. It is rougher then the other parts of the dug that the infant may the more firmly hold it. It is of an exquiſite ſence, that the nurſe ſhould finde ſome pleaſure when ſhe giveth ſuck. It is framed of the reduplication of the skin.

What Milk is.

Now the milk which is drawn thorow the holes of it by the infant, is nothing elſe but a white liquor, engendred of the venal and arterial blood, ſent from the matrix, and altered by the glandules of the dugs; in taſte pleaſant, which is eaſily concocted by the ſtomack,and doth ſpeedily and plentifully nouriſh.

As for the muſcles, they are ſet downe in the Treatiſe of Muſcles, Cap.15.

The bones, which were ſaid to be the third proper externall containing part, are ſet downe in the Doctrine of bones.

CAP. III.

Of the proper internall containing parts.

THeſe are in number three, the *Pleura*, the *Mediaſtinum*, and the *Pericardium*.

The *Pleura* hath its denomination from the ribs, under which it is placed, and ſo it may be termed in Engliſh, the Coſtall membrane.

Its ſubſtance.

It is a membrane, white, thin, hard, reſembling the *peritonæum*.

Spigelius de human. corp. Fabr. lib.9.cap.3. will have it to be thicker er and ſtronger than the *peritonæum*, contrary to the opinion of *Riolan*, who affirmeth the *peritonæum* to be thicker and ſtronger; becauſe it is appointed for the ſuſtaining the weight of the guts.

Its parts. It is everywhere double: the inner part is thickeſt, ſmootheſt, and as it were bedewed with a wateriſh humour, that it ſhould not hurt the lungs by its roughneſſe: This wateriſh humour doth ſpring from the vapours raiſed from the blood condenſed, by reſpective coldneſſe of the membrane. The outer part is thinner, yet rougher; that it ſhould cleave the more firmly to the ribs.

Its figure As for its figure, without it is arched, within hollow: Above it is narrower, below broader, chiefly towards the ſides: From it ſpring ſome ſinewie fibres, by the which the lungs are tyed to it. If theſe be too ſtrait, the motion of the lungs is hindered, and ſo an uncurable difficulty of breathing procured.

Its holes Above, it is perforate in five places,

ces, to give way to the *vena cava*, and the *aorta* aſcending, the *gula*, the wind-pipe, and the nerves of the ſixth paire. Below where it covereth the midriffe, it is perforate in three places, to give way to *vena cava*, and the *aorta* deſcending, as alſo to the *gula*.

Its beginning. It is framed of the membranes covering the *ſpinalis medulla*; for thoſe joyning with the ſinews of the breſt, growing broader, produce it.

Its veſſels. It hath veins and arteries for nouriſhment and life; and nerves for feeling.

Its veins. On each ſide it hath 12 veines; whereof the two uppermoſt ſpring from the higher intercoſtal branch, and the ten lower from the *vena ſine pari*.

Its arteries. So many arteries are in like manner; whereof the four uppermoſt proceed from the ſuperior intercoſtal; and the inferior eight from the hinder part of the *aorta*, deſcending.

Its nervs It hath twelve nerves in like

manner; whereof the four branches which ſpring from the *vertebra* of the breſt, are beſtowed upon the forepart; but the hindermoſt branches are beſtowed upon the muſcles, which are placed upon the back.

The ſeat of the veſſels and the pluriſie.

Theſe veſſels are placed between the duplication of the *Pleura*, and the pleuriſie it ſelf is not ſeated in this place onely, but between the *Pleura* alſo, and the intercoſtal muſcles.

Its uſes.

It hath two uſes: Firſt, to wrap in all the vital parts. Secondly, to defend them from all external injuries.

Of the Mediaſtinum.

The ſecond membrane is the *Mediaſtinum*: becauſe it ſtandeth in the middle of the breſt, and divideth the right ſide from the left.

It hath not onely a duplication as the *Pleura* hath, but is double alſo; for one is in the right ſide, the other in the left. They are united according to the longitude of the *vertebræ* of the back; but ſevered towards the *ſternum*.

In

Obſervation.

In the cavity between theſe parts of the *Mediaſtinum*, one may be deeply wounded, without any great danger of death. Such a wound you ſhall eaſily diſcerne; Firſt if ſmall ſtore of blood iſſue out. Secondly, if no breath come out.

This cavity is ſeen when the *Cartilago xiphoides* is removed. In the dropſie of the lungs, and when corrupt matter is gathered, the *ſternum* here may be tripaned.

Its ſubſtance.

The ſubſtance of it is membranous, yet thinner and ſofter than the *Pleura*. The innerſide towards the lungs is ſmooth, and hath fat about the veſſels; but the exterior is rougher, by reaſon of the fibres, by the which it is tyed to the *Pleura*.

Its largeneſſe.

It reacheth from the throat to the midriffe.

Its veins.
Its arteries.

As for its veſſels, veins and arteries, it hath from thoſe called *mammariæ*, but ſmall, and from *vena ſine pari*.

It hath oue ſpeciall veine called

mediaſtina, which ſpringeth from the lower part of *ramus ſubclavius.*

Its nervs

The nerves called *ſtomachici*, paſſe by the reduplication of it. It hath three uſes: Firſt, it divideth the breſt and lungs in two parts, that one being wounded, the other ſhould be ſafe.

Secondly, it holdeth up the *pericardium* firmly, wherein the heart is contained, that it ſhould not reſt upon the back bone, when we lie upon our back; or that it ſhould fall upon the breſt bone when we bend our ſelves towards the ground; or touch the ribs when we lye upon our ſides.

Thirdly, it giveth a ſafe paſſage to the veſſels which paſſe by it.

Of the *pericardium.*

The third proper containing part is the *pericardium*, ſo called becauſe it compaſſeth the whole heart, whoſe figure it hath, for it is pyramidall. It is ſo farre diſtant from the heart, as is ſufficient to give way to the motion of the ſame, and the containing of the wateriſh humour.

Its membranes. Its connexion. Its beginning.

It hath two membranes: 1. Outer, from the *mediaſtinum*, it is tied before and behinde to the *pleura*; from whence both the *mediaſtinum* and *pericardium* originally ſpring. 2. Inner, proceeding from the external tunicles of the veſſels of the heart: for within the *pericardium* the veſſels lack their common tunicle, it having been ſpent upon the *pericardium*.

The external membrane is fibrous; but the internal is ſlippery, but firm and thick. The motion of it is ſecondary from the heart.

Its ſituation.

It leaneth more to the left ſide then to the right, and more to the fore then back part. It cleaveth ſo firmly to the nervous circle of the midriffe, that it cannot be ſeparate from it without rending, to direct the motion of the heart.

Its holes

It is perforate in five places. In two, for the entring in and paſſing out of the *vena cava*. In three for *vena arterioſa*, and *arteria venoſa*, and the paſſing out of the *aorta*.

It

Its veſſels.

It hath ſmall veines from the *phrenicæ*, and the axillar. No arteries appear becauſe it is neer enough to the heart.

Its uſes.

It hath two uſes: Firſt, to keep the heart in its own place, whether we bend our bodie backward, forward, or to either ſide.

Secondly, to contain the wateriſh humour, which is ſundry wayes profitable: for firſt it tempereth the heat of the heart: Secondly, it moiſteneth the ſame: Thirdly, it maketh it ſlippery: Laſt of all the *pericardium* defendeth the heart as an armour from all external injuries.

The wateriſh humour in the *pericardium*.

The wateriſh humour which is contained in the *pericardium*, is like urine, yet not ſharp or ſaltiſh. If it be thick and ſlimy, it cauſeth the heart to be hairy. If it be too copious, it cauſeth the panting of the heart, which is cured by phlebotomy. It is too plentiful in thoſe who have obſtructions of the meſaraical veines, liver, or ſpleen: for in ſuch the thinneſt part of the *chylus* onely is drawn for nouriſhment, and ſo the blood becometh watriſh.

Its generation.

Some think it to proceed from a ſeminal aquoſity, even from the firſt generation: as the air within the eares is from a flatuous. Others think that it is ingendred of vapors raiſed from the blood, and wateriſhneſs of the veines and arteries of the heart, and condenſed by the reſpective coldneſs of the membrane, and by this means the *peritonæum* and the *pleura* ſeem always bedewed with moiſture.

It ſeemeth that the firſt beginning of it is a ſeminal humidity, and that is maintained afterward by the vapors.

Sometimes alſo there is contained in the capacity of the breſt, a bloody water to moiſten, and temper the heat of the lungs.

The bloody water in the capacity of the breſt.

It is cauſed partly of the vapours raiſed from the veſſels, partly of that portion of drink, which paſſeth to the lungs: and by reaſon of this water, and blood did flow from the ſide of our Saviour pierced.

CAP. IV.

Of the trunk aſcending from the Vena Cava.

Now the parts contained in the breſt, are either *vaſa* or *viſcera*, the veſſels or the entrals.

The veſſels are in number four, the *vena cava*, the *vena arterialis*, the *arteria venoſa*, and the *aorta* or *arteria magna.*

The *Vena cava.*

The firſt is the *vena cava*, or *magna*, becauſe the hollowneſs of it is great. It hath its beginning from the liver. The orifice of it is three times as large as that of the *aorta*: being received by the right ear of the heart, it is expanded into the whole right venticle of the ſame.

Its valvs.

About the orifice of it are placed three valves called *trifulcæ* or *tricuſpides*: becauſe ariſing from a large foot, they end into a narrow top repreſenting barbed arrowes.

Their ſituation is from without inward, ſo that the blood may be let in, but not returne. They proceed from a membranous circle, annexed to the orifice: They cleave to the *ſeptum* of the heart; towards the point of it be ſtrong fibres ending in round caruncles.

If you would ſee theſe as the reſt of the valves, cut tranſverſly the ventricles of the heart neer to the *baſis*, and then they will appeare.

The trunk deſcending

It hath two trunkes, one deſcending, and this is that which is cauſed of a number of ſmall veines, appearing in the hollow part of the liver, which meet about the middle of it in one trunck ſtill decreaſing in number, and encreaſing in bigneſſe.

The trunk aſcending

The other aſcending; this is procured by a number of ſmall veins, ſpringing from the convex part of the liver, which end in like manner into one trunck about the middle of it.

This is bigger than the deſcending becauſe all the upper parts are fed by this onely; whereas moſt of the parts contained in the abdomen, are nouriſhed by the *vena portæ*.

The lateral ſprigs of the trunk aſcending.

Althongh it be not divided into branches untill it come to the throat; yet it doth ſend forth ſundry ſprigs from the ſides.

1 *Phrenica*

The firſt is called *phrenica*, one in each ſide. It is inſerted into the *diaphagma*, which is called φρένες, by a number of twigs, and from thence it beſtoweth twigs upon the *pericardium* and *mediaſtinum*

The ſecond is called *Coronaria*, ſo called becauſe like a garland it compaſſeth the *baſis* of the heart. It ſendeth ſundry twigs to the outer parts of the heart; but chiefly to the left: becauſe it needeth greater ſtore of nouriſhment, by reaſon of its ſtronger motion.

This hath a valve which hindereth the returne of the blood, to the *vena cava* This ſpringeth from the *cava*, before it enter into the heart, and the blood is ſomewhat thick, and not attenuate in the ventricles of the heart; for the ſubſtance of the heart, being hard and firme, was to be nouriſhed by blood ſomewhat groſſe.

3. *Vena ſine pari.*

The third is called ἄζυγος, or *ſine pari*, without a mate; becauſe it hath not a fellow as other veines have in the leftſide, if you except thoſe beaſts which chew the cud.

This ſpringeth from the *cava*, as ſoone as it is come out of the *pericardium*. It paſſeth out of the hinder and right part of the *vena cava*, about the fifth *vertebra* of the breſt. It doth not deſcend ſtraight way : But comming a little forward, it returneth towards the *ſpina*.

When it is come to the eighth or ninth rib above the *ſpina*, it is divided into two branches, to wit, the right and the left; Then paſſing by the diviſion of the midriffe, which is between the two productions of it, they are ſpred thorow the abdomen. Of theſe two, the left is inſerted into the left emulgent.

By which way matters in the breſt are diſcharged.

By this way *Fallopius* will have watriſh, purulent and bloody ſubſtances to be diſcharged, which ſometimes are contained in the breſt, while theſe branches march downeward: In each ſide ten ſprigs bud out, which march thorow ſo many diſtances of ſo many of the inferior ribs.

In the lower part of the rib, there is a groop to receive the ſprig. Wherefore when you make inciſion in an *empyema*, come not neer to this part. From this veine other ſmall twigs alſo proceed; which afford nouriſhment to the *ſpinalis medulla*.

Theſe are called *coſtales inferiores*, or the lower intercoſtals. The *vena ſine pari* thus being framed, the *cava* aſcendeth to the *jugulum*, ſtrengthned by the *mediaſtinum* and the *thymus*; which is placed in the uppermoſt part of the breſt.

The divarication of the *Vena cava*

Here the *vena cava* is partted into two remarkable branches: From whence al thoſe veins ſpring, which are ſent either to the head or armes.

One branch marcheth to the right, another to the left ſide: while they remain within the breſt, they are called *ſubclavii*, becauſe they march under the cannel bones; but when they are come to the arm-pits, they are called *axillares*.

Sprigs proceeding from the *Cava* within the breſt.

Before they come to the arm-pit, ſundry ſprigs ſpring from them.

1. *Intercoſtalis ſuperior.*

The firſt is *intercoſtalis ſuperior*, this ariſeth from the root of the divarication; and paſſing by the root of two ribs beſtoweth twigs upon the diſtances of the two upper ribs, as the *vena ſine pari* did: there is one in each ſide.

2. *Mammaria.*

The ſecond is called *mammaria*; this marcheth forwards towards the upper part of the bone of the breſt. From thence it goeth down by the ſides of it: and when it is come to the *cartilago mucronata*, about the ſides of it, it paſſeth out of the breſt, and marcheth by a ſtraight way under the ſtraight muſcles to the navil, where it is joyned with the *vena epigaſtica* *aſcendens* by inoſculation: which is the cauſe of that great conſent, which is between the paps and the matrix. This before it leave the breſt, it beſtoweth one branch upon the cartilaginous diſtances of ſeven of the *coſtæ veræ*, where the ſprigs of the *vena ſine pari* end. From theſe branches proceed ſome other remarkable twigs, which are beſtowed upon thoſe muſcles, which are ſeated upon the breſt, and the dugs.

3. *Mediaſtina.* The third is called *Mediaſtina*, becauſe it is beſtowed upon the *mediaſtinnm* together with the left nerve of the midriffe, according to the length of it.

4. *Cervicalis.* The fourth is called *Cervicalis* or *vertebralis*. It is large in each ſide, marching upwards obliquly towards the back part, it commeth to the tranſverſe proceſſes of the *vertebræ* of the neck, where paſſing thorow the holes of them, it beſtoweth branches upon the muſcles which lie above the *vertebræ*.

The fifth is called *Muſcula inferior*, becauſe it is ſpent upon the lower muſcles of the neck, which ſtretch out the neck and head.

5. Muſcula inferior

The ſixt is the internal jugular; this ariſeth where the cannel bone is articulate with the *ſternum*. This joyned with the nerve recurrent, and the ſoporal artery, marcheth by the ſide of the winde-pipe, to the throat.

6. The internal jugular.

The ſeventh is the external jugular; this marching up under the skin, and the quadrat muſcle, which pulleth down the cheeks, commeth to the ear. This in beaſts is bigger then the internal, otherwiſe then it is in man.

The externall jugular.

CAP. V.

Of Vena arterialis, and arteria venalis.

THe ſecond veſſel in the breſt is *Vena arterialis*. It is a veine from its office: for it carrieth natu-

Vena arterialis.

natural blood to the lungs by the right ſide of the winde-pipe: It is called an artery, becauſe the coat of it is double, not ſingle as that of veines. It doth ſpring from the upper part of the right ventricle of the heart, and is implanted into the ſubſtance of the lungs by the right ſide of the winde-pipe.

Arteria venalis.

The third veſſel is *arteria venalis*. It is called an artery, becauſe it carrieth arterial blood; but a veine, becauſe it hath a ſingle coat as a veine. It ariſeth from the upper part of the left ventricle of the heart, and is implanted into the ſubſtance of the lungs by the left ſide of the winde-pipe.

The valves of theſe two veſſels.

The *Vena arterialis* hath three valves called *Sigmoides*, from the figure of the great *ſigma*, which anſwereth the Latin S. the figure is this C. They look from within outwards, to let out the blood; but to hinder the return of the ſame.

The *Arteria venalis* hath two vavles called *mitrales*, because they are like a Biſhops Miter. They look from without inward, to let in blood carried from the *vena arterialis*. They are bigger than thoſe of *vena cava*; and have longer filaments, and to ſtrengthen them many fleſhy ſnippets are joyned to them.

It hath two valves only, that the fuliginous vapours might the more readily be diſcharged.

It hath alſo but a ſingle thin coat, partly for the ſame purpoſe; partly becauſe the blood ſent from the *vena arterioſa* is cooled by the *bronchia* of the lungs, before it entereth into *arteria venalis*: it needeth not ſo thick a coat as an artery; and becauſe veins only carry in blood, and arteries carry out, Therefore *arteria venalis* is placed in the left ventricle, and *vena arterialis* in the right. Both theſe veſſels not far from their beginning, are divided into two branches, whereof the one paſſeth to the right part of the lungs, and the other to the left; and each of theſe is ſubdivided into other branches, untill at the laſt they end in ſmall threds.

The greater branches accompany one another, ſo that the veine ſtill marcheth with the *arteria* joyned together by many inoſculations or *anaſtomoſes.*

Between them the branches of *aſpera arteria* march. Theſe veſſels are great, becauſe the lungs by reaſon of their perpetuall motion require much nouriſhment.

How the blood is carriedto the left ventricle of the heart.

Firſt, the blood is carried into the lungs by *vena arterialis*, and from hence to *arterea venalis*, by ſundry *anaſtomoſes*, and from hence to the left ventricle of the heart. Where being made ſpirituous, it is ſent by the *aorta*, to impart life to the whole body.

One thing is to be noted, that no air in its proper ſubſtance is carried to the heart: for the blood contained in theſe two veſſels, is ſufficiently cooled by the *bronchia* paſsing between them

How the blood is cooled.

The blood is cooled. Firſt, by ſtaying in the lungs while it is in paſſing.

Secondly, by touching the *bronchia* cooled by the attraction of freſh air: And thirdly, by the continual motion of the lungs.

One thing is to be noted, That in *arteria venoſa* a little below the valves there is found a little valve ever open. It being removed, there appeareth a hole, by the which the blood paſſeth freely from the *vena cava* to it, and returneth by reaſon of this *anaſtomoſis*; that the blood in the veines may be animate.

CAP. VI.

Of the great arteries, and firſt of the trunk aſcending of the ſame.

THe fourth veſſel is the great artery called *aorta*; becauſe it receiveth the air. It ſpringeth from the upper part of the left venticle of the heart, where it is largeſt and hardeſt.

Coronariæ arteria.

Before it come out of the *Peri-*

cardium, it ſendeth two ſmall twigs, from each ſide one: which compaſs the *baſis* of the heart, like a garland, and ſend down according to the length of the heart other twigs: Theſe are called *Coronariæ*. Theſe twigs are more in number, and larger about the left ventricle then the right, becauſe it requireth greater plenty of nouriſhment, by reaſon of its ſtronger motion, which digeſteth much blood.

The ſituation of the *aorta*.

It is placed between the windepipe and the *vena cava*, tied to the mouth of the ſtomack, paſſing under the trunk of *vena arterioſa* upward: when it hath pierced the *Pericardium*, it is divided into two trunks; whereof the one is called *truncus aſcendens*, the aſcending trunk: The other *deſcendens*, the deſcending.

Its trunks.

Of theſe two the deſcending is largeſt, becauſe it miniſtereth life to more parts.

The branches of the trunk aſcending

This aſcending trunk before it paſſes to the armes, is divided into two branches, whereof one paſſeth to the right, the other towards the left arme; they are called *ſubclaviirami*, becauſe they march under the canell bones. When they are gone out of the breſt, they are called *Axillares*. From both the lower and upper part of both theſe branches, ſundry ſprigs doe ſpring.

From the upper part.

From the upper part proceedeth *intercoſtalis ſuperior*, which beſtoweth twigs upon the diſtances of the uppermoſt foure ribs. From whence others are ſent to the adjacent muſcles, and the *ſpinalis medulla*.

From the lower part.

From the lower ſpringeth that branch, which is called *Cervicalis*, but more fitly *Vertebralis*; for it ſpringeth behinde where the *vertebræ*; from thence marching upwards it beſtoweth twigs upon the *ſpinalis medulla*, which enter by the paſſages, by the which the nerves, as alſo upon the muſcles, which are placed in the hinder part of the necke, and at the laſt entereth into the *Cranium*, by that hole,by the which the *ſpinalis medulla* deſcendeth from the braine.

This with its fellow when it is come to the cell of the wedg-like bone on each ſide of it, between the firſt and ſecond pair of ſinewes, having been divided, cauſes *Plexus coroides*.

2. The ſecond, the *Arteria mammaria*, which accompanying the *Vena mammaria*, is joyned with the *epigaſtrica arteria*, aſcending by inoſculation about the navell.

3. The third is that called *Muſcula*, and is diſtributed upon the muſcles of the neck.

4. The fourth is the Soporall, one on each ſide; ſo called, becauſe if they be ſtopped, ſleep doth immediately follow.

Theſe ſoporall arteries when they are come to the throat, they are divided into two branches, to wit, the externall, which is leſſer, and the internall which is larger.

The externall beſtowes twigs upon the muſcles of the face, upon the roots of all the teeth of the lower jaw, having entered into the cavity of the mandible, and going out upon the chin.

The internall branch when about the throat, it hath beſtowed twigs upon the tongue and larynx, about the lower part of the skull, it is divided into two branches; whereof the leſſer and hinmoſt accompanying the branch of the internall jugular marcheth toward the hindermoſt part of the skull, and entering at the ſecond hole of the nowle entereth into the hollowneſſe of the *Dura mater.*

The formoſt and largeſt, when it hath entered into the cavity of the skull, thorow its proper hole in the parietall bone, and is come to the cell of the wedge-like bone, it maketh *rete mirabile*; which in beaſts is large, but in man very obſcure.

CAP.

CAP. VII.

Of the deſcending trunk of the Aorta.

THE deſcending Trunk of the *aorta* about the fifth *vertebra* of the breaſt bending towards the left ſide, marcheth downwards towards the laſt *vertebra* of the loynes.

In this march it ſendeth forth ſundry branches, which are theſe:

The branches of the trunk deſcending

1. Intercoſtall inferior arteries in number eight. 2. *Phrenicæ* two, 3. *Cœliaca* one. 4. *Meſenterica ſuperior*. 5. *Emulgentes* two. 6 *Spermaticæ* two. 7. *Meſenterica inferior.* 8. *Lumbares.*

1. The inferior intercoſtals.

The inferior intercoſtall arteries, accompanying the veines and nerves of the ſame denomination march according to the length of the lower part of the ribs, where there is a hollowneſſe to receive them, and in the true ribs end, where the cartilages begin; but in the ſhort ribs they go a little further, even to the ſides of the lower belly.

Theſe ſend ſprigs by the holes of the nerves to the marrow of the back, and to the muſcles which reſt upon the *vertebræ* of the back.

By what way quittour and water is ſent from the breſt to the bladder.

Theſe not onely afford ſpirits and blood, to the intercoſtal muſcles; but carry alſo quittour and water gathered in the cavity of the breſt, ſent by the trunk of the *aorta* to the bladder, by the emulgent arteries, according to *Spigelius lib.* 6. *cap.* 4. whereas *Fallopius* will have theſe matters to be ſent by *vena ſine pari*; but this is a ſhorter way.

2. *Phrenicæ.*

Phrenicæ are two, one on each ſide: they ſpring from the trunk as ſoon as it is come out of the cavity of the breſt, and being ſpread into many twigs, whereof the moſt are beſtowed upon the lower part of the midriffe, where the *vertebræ* of the back are; and ſome alſo upon the upper part, which afterward paſs to the *pericardium* where it cleaveth to the midriffe.

3. *Cœliaca* *Cœliaca* is one, ſo called, becauſe it ſendeth twigs to the ſtomack. This ſpringeth from the fore-part of the trunk. This beſtoweth branches upon the ſtomack, liver, gall, caule, the *duodenum*, the beginning of the *jejunum*, to a part of *Colon*, to the *Pancreas*, and ſpleen.

4. *Meſenterica ſuperior* doth ariſe a little below the *cœliaca*, accompanying the *vena meſeraica*. It beſtoweth many twigs upon the hungry and *Ilium* gut; as alſo upon that part of *Colon* which lieth between the hollow part of the liver, and the right kidney. So that this branch is beſtowed upon the upper part of the meſentery.

5. The emulgent arteries are two, the right and the left. They ſpring from both the ſides of the trunk under the former, where the firſt and ſecond *vertebræ* of the loyns are coupled by a ligament. The left is lower then the right. Theſe

when they are come to the kidneys, are divided into two branches, which are inſerted into the cavities of the kidneyes, and by innumerable ſmall twigs are ſpent upon the ſubſtance of the kidney. The uſe of theſe, beſides the common, is to diſcharge the ſeroſity of the arteries, whereof they have great ſtore.

6. *Spermaticæ*, or *ſeminales*, the Seminary; they are in like manner two, which ſpring from the forepart of the trunke.

The left artery doth not ſpring from the left emulgent artery as the veine doth. Theſe marching downeward, accompany the veins of their ſide. In men they are carried to the ſtones by the productions of the *peritonæum*; bnt in women when they are come neer to the ſtones, they are divided in two branches; whereof the one is beſtowed upon the ſtones, and the other upon the bottome of the matrix, in the ſide of it.

7. *Meſenterica inferior*, it ſpringeth

about the *os ſacrum*, from the trunk a little above, before it ſendeth forth the *rami iliaci*. It is beſtowed upon the left part of the *Colon*, and the *rectum*; and accompanieth the Hemorrhoidicall veines to the *anus*.

Lumbares rami, the Loyne branches, in number foure: They ſpring from the backe part of the deſcending trunke of the *aorta*. Theſe paſſe to the *vertebræ* of the loynes, and their marrow by their holes, as alſo to the adjacent muſcles Some things here offer themſelves to be obſerved.

1. That when either the colicke is changed into the gout, or contrarywiſe the gout into the colick; if the laſt happen, then the humors are ſent from the crurall arteries to the trunke, and from thence to the meſentericall branches of the arteries; and from thence to the guts. If the firſt happen, then the humours paſſe the contrary way. *Read Hip.6. Epid. Sect.4.*

2. If the colicke turne either

to a palſey, or falling ſickneſs, as it may fall out, according to *Æginet. lib.* 3. *cap.* 43. then the humour doth return from the *Colon* by the meſenterical arteries, to the trunk; and from hence to the *Lumbares*, which being filled compreſs the adjacent nerves: from whence difficulty of going enſueth; which may be called an imperfect palſey. If the falling ſickneſs be procured, the humour is ſent to the groyn-arteries, and thence to the brain.

3. Clyſters may purge the whole body: for the clyſter moiſtning the whole *Colon*, may by the twigs of the arteries draw noiſome humours from the trunk, and when purgation is cauſed by anointing the navil (which often falleth out in uſing the unction for the pox) or vomiting by miniſtring a clyſter, wherein white Hellebore is, firſt the arteries draw the force of the medicaments, and this ſame faculty again doth purge by the arteries.

9. 9. *Arteriæ ſacræ*, or thoſe branches which go to the *os ſacrum*. They ſpring from the lower part of the trunk, before it ſendeth out the *rami iliaci*. They are ſomewhat large. They marching downward, and leaning upon the *os ſacrum*, enter into the holes of it, and ſo paſs to the marrow, and hinder part of the ſame. By theſe the matter which cauſeth the cholick may paſs to procure the palſey of the legs.

10. *Iliacæ arteriæ*, theſe ariſing below the former, about the lower *vertebra* of the loyns, mount above the veine, leaſt it ſhould be hurt by the hardneſs of the *os ſacrum*, in their continual motion.

They being in number two large branches, called *Arteriæ iliacæ*, or flank arteries, and marching downward to the thigh obliquely they repreſent the Greek λ inverted. Theſe a little below the diviſion of the trunk are ſubdivided into two branches, to wit, the internal or leſſer *Iliaca*, and the external or greater.

The internal hath two branches; The one is called *Glutæa*, and with a vein of the ſame denomination, is beſtowed upon the muſcles which make up the buttocks: The other is called *Hypogaſtrica*.

This is large; this being carried directly to the lower part of the *os ſacrum*, in men it beſtoweth twigs to the bottom and neck of the bladder, and to the ſtraight Gut; but in women wherein it is larger, it ſendeth plenty of twigs upon the bottom and neck of the matrix beſides the former parts. The external or greater hath two branches.

The firſt is called *Epigaſtrica*. It ſpringeth from the outter part of the artery a little before it paſs thorow the *Per tonæum*; and turning upwards it mounteth upwards by the inner ſide of the ſtraight muſcle of the belly: and about the navil it is inoſculate with the *arteria* deſcending.

The ſecond is called *Pudenda*: This is but a ſmall branch, and when it is come out of the *peritonæum*, it paſſeth obliquely by the joyning of the *os pubis*, and is beſtowed upon the skin of the ſecret parts.

A note.

One thing is to be noted, that the *Arteria umbilicalis* ſpringeth from the internal *iliaca*; and going along the great artery, is firmly tied to the bladder by ſtrong membranes.

When the child is in the belly, it is hollow; but without hollowneſs when the infant is born.

The Valves.

About the orifice of theſe veſſels, eleven valves are to be ſeen if the ventricles of the heart be diſſected tranſverſe neer to the *baſis*. Of theſe ſome are called *triſulcæ*, and reſemble a barbed arrow; ſome *Semilunares*, or *Sigmoides*, becauſe they reſemble a half moon, or the Greek letter called C. Thoſe bend inwards. becauſe they are ſet before the veſſels which carry in blood.

They bend outward,becauſe they are appointed for the veſſels which carry out the blood.

The *Vena cava* hath three *Triſulcæ*; but the *Arteria venoſa* two.

The *Aorta*, and *vena arterioſa* have three *Sigmoides*.

CAP. VIII.

Of the hearts ſimilary external parts.

Its appellation

Its figure

HItheto of the veſſels of the breſt: Now follow the entrals, which are the heart and lungs. The heart in Latin is called *cor*, from the Greek word καρδία, from κρατία; ſo called, by reaſon of the ſoveraignty which it hath above other parts of the body; or from κραδία, which is derived from κραδαίνεσθαι, becauſe it is toſſed with continual motion: of figure it is *pyramidal*.The Ancients likenend it to a Pine Apple.

As

Its bigneſs. As concerning its bigneſſe, it is larger in man than in beaſts, if you conſider the ſtature of his body. The externall ſuperficies of it is ſmooth, but within it is unequall, and hath many fibres.

Its ſubſtance. The ſubſtance o it is fleſhy, red, and compact. It is ſixe inches in length, and foure in bredth.

Its connexion. It is tyed above to the *mediaſtinum*, below to the *diaphragma*, by meanes of the *pericardium*.

Its parts. The parts of it are either diſſimilary, or ſimilary.

Its diſſimilary parts. The diſſimilary are two, to wit, *Baſis*, or the head, which is round and broad, and *mucor*, or *apex*, the ſmall point, which doth bend towards the left ſide, and forwards under the left pap, where one may feel the motion of the heart.

The ſimilary. External 1. The fat. The ſimilary parts are either externall, or internall. The externall are foure; to wit, the fat, the membrane which covereth it, its veſſels, and the eares. The fat is more copious in man than in beaſts, chiefly in the upper part, where the veſſels paſs out.

The membrane. The vein

The membrane with the which the heart is covered, is thin, and cannot be ſeparated from it. The vein whereby it is nouriſhed is called *Coronaria*; becauſe in figure it is like to the Crowns of the ancient Kings; for it compaſſeth the *baſis* of the heart round about, and from thence ſendeth branches to the whole ſubſtance of it, even to the point of it. In the right ſide they are fewer and leſſer; but in the left, thicker and larger. This vein ſpringeth from the aſcending trunk of *vena cava*, a little before it entereth into the right ventricle.

The Arterie.

Arteria Coronaria compaſſeth the *baſis* of the heart, as the veins doth, and ſendeth ſprigs to the whole heart, but chiefly to the left ſide. It ſpringeth from the beginning of the *aorta*, before it paſs thorow the the *pericardium*.

Nerves.

It hath nerves from the ſixth conjugation, but ſmall; beſtowed upon the *baſis* neer the *vena arterioſa.*

The ears

The laſt external part are the ears, both becauſe they are like to the ears of a dog, and are faſtned to each ſide of the heart, as ears are to the head. Their ſubſtance is nervous: they have three ſorts of *fibres*, and are not much thicker then the skin. In figure they are pyramidal, ſomewhat ſharp at the top: they are unequal both without, and within; yet they being full of blood, the external ſuperficies ſeemeth ſmooth. In number they are two; the right which is ſeated before the orifice of the *vena cava*, and the left ſeated before the *arteria venalis.* They differ; for firſt, the right is largeſt; ſecondly, the left is harder, more fleſhy, and thicker: thirdly, the left is more pointed, and broad. The motion is contrary to that of the heart; for when the heart is dilated, they are contracted to expel, and contrariwiſe. The blood is firſt of all received and ſtayed in theſe ears, and for two reaſons. Firſt, that the whole heart ſhould not be too much ſtretched by the influx of blood, and ſo the dilatation and conſtriction of it hindered; as we ſee in a bladder too much filled with water. Secondly, that the veſſels would not burſt; and ſo when the heart is dilated, they are contracted; and ſoftly poner in the blood. They are two, becauſe there be two veſſels which carry in blood to the heart, to wit, *vena cava*, and *arteria venoſa*; and becauſe the *cava* is larger then the *arteria venoſa.*

The ſubſtance of the eares is nervous, becauſe they were to admit dilatation and conſtriction, The veines hath a ſemilunary valve to hinder the reflux of the blood, when the heart is contracted. The fat about the heart moyſtneth it; and yet is not melted by the heat therof, becauſe it is ſuet, and not greaſe.

CAP. IX.

Of the ſimilary internal parts.

THe internal parts of the heart are the two ventricles, the right and the left, and the *Septum*.

Of the Ventricles.

How the Ventricles differ.

The ventricles do differ in theſe points. 1. in bigneſs; ſo the right is much bigger then the left; for it reacheth from the *baſis* to the *mucro*. 2. In the blood contained; for the blood in the right ventricle is venal, but in the left arterial. 3. In figure; for the right is ſemicircular, but the left orbicular. 4. The left ventricle is placed exactly in the middle of the heart: for the right ſeems onely to be an appendix ſet onely to the ſide. 5. The left ventricle is of a more ſolid and compact ſubſtance, and is three times thicker then the right. 6. The right ventricle was appoined by nature to miniſter nouriſhment to the lungs; but the left to be a ſtore-houſe of vitall blood whereby it is communicate to the whole body. If you diſſect the heart according to the longitude from the *baſis* to the point, you ſhall finde the internall ſuperficies very unequall, full as it were, of pits; yet the left ventricle is moſt unequall. In both theſe ventricles you may note ſome fleſhy fibres ſpringing from the *mucro* of the ventricles, which becomming membranous fibres are inſerted into the lower parts of the valves. There are five in the right, but in the left two only, yet more thick and ſolid.

The action of the heart

The action of the heart is called *pulſation*. The cauſe of this is a peculiar faculty granted to the heart, flowing from the forme of it. The pulſation hath two motions, dilatation and conſtriction.

Dilatation.

In dilatation the *mucro* is drawn to the *baſis*; for ſo it becommeth ſphericall and more capable. In this motion it draweth blood to it ſelfe from the trunke of the *vena cava*. This motion is performed when the ſtraight fibres are contracted, and the tranſverſe relaxed.

Conſtriction.

In conſtriction the *mucro* doth fall from the *baſis*, and ſo the heart becommeth narrower. By this motion the vitall blood is expelled out of the heart. This motion is performed by the conſtriction of the tranſverſe fibres. Between theſe contrary motions we muſt imagine ſome reſt.

The *Septum*.

Theſe ventricles are divided by the *ſeptum*, which is nothing elſe but the right wall of the left ventricle; wherefore the right ſide is bunched, but the left hollow. It is unequall as the ventricles. The pits are not permeable, and ſo no blood can paſſe through the *ſeptum*, from the right to the left ventricle.

CHAP.

CAP. X.

Of the frame of the Lungs.

THe ſecond entral of the breſt, to wit the Lungs follow, called in Latin *Pulmo*, and in Greek πνεύμων; becauſe they are the inſtruments of breathing: we are to conſider their frame and action.

Its ſubſtance.

As concerning their frame, theſe things are to be marked. 1. The ſubſtance. In a man it is of the colour of a Roſe, ſpongious and light, ſo that it ſwimmeth in water: but in a child in the womb it is redder, harder, and heavier, and doth ſink in water; becauſe it is fed with venal blood, derived from the *vena cava* to *arteria venoſa*, by *anaſtomaſis*.

Its lobes

2. The Lobes, they are ordinarily two, ſometimes three. If there be two, the upper is ſhorter then the lower. They cleave together

by membranous tyes: they are like to the horn of an Ox; for towards the breſt they are bunches, but towards the back hollow.

Its membrane.

The lungs are covered with a membrane. It is framed of the common coat of the veſſels, which are beſtowed upon the lungs. It is thin, ſoft, and very porous, to give way to noiſome matters, which ſometimes are carried to the *aſpera arteria*, to be voided by ſpitting.

Its veſſels.

3. As for its veſſels; veins it hath from the *vena arterialis*, which paſſeth out of the right ventricle of the heart. Arteries it hath from the *arteria venoſa*. The firſt beſtow nouriſhment, the ſecond, life. As ſoon as they touch the lungs, they are divided into two branches, and thoſe into more until at laſt they end into thred-like twiſts. It is fed neither by the *vena cava*, nor *portæ*; becauſe the blood contained in theſe is too groſs; for they require for nouriſhment a blood, between venal

and arteriall, which is not ſeen in any other part of the body. The blood is carried from the right ventricle of the heart, from the *vena arterialis* to the *arteria venalis*. And ſo the hot blood of the left ventricle is cooled; as the meane boyling of a pot is ſtayed by powring in ſome cold water. It hath a ſmall nerve from the ſixth conjugation, which goeth no further then the membrane, which affordeth but a dull feeling.

The cooling of the blood of the heart

4. The wind-pipe remarkable is Latine *aſpera arteria*. It is called an artery, becauſe it receiveth in the aire by inſpiration: *aſpera*, becauſe its ſubſtance is unequall.

The Winde-pipe.
Its denomination

It may be thus deſcribed: It is a long pipe framed of round cartilages, tyed together by membranes, ever open, which beginning at the lower part of the throat, and reſting upon the mouth of the ſtomack, is implanted into the lungs by many branches. It hath two parts; the upper,

Its deſcription

Its parts

which is called *larynx*; and the lower, which is called *bronchus*. In the upper part there is a chinke that the aire paſſing thorough a narrow paſſage might cauſe a ſound. The inſtruments of the voice are moyſtned by the glandules, to cauſe the cleerer ſound.

The *rima*.

Its frame

The winde-pipe is not altogether cartilaginous; for ſo it could not have been dilated; nor altogether membranous, for then it would have ſhrunke together: whereof the cartilages are tyed together by membranes. Theſe cartilages are like to the Greek C. The winde-pipe then beginning under the annular cartilage of the *larynx*, it paſſeth downeward ſtraight waies, becomming by degrees ſmaller; it cleaveth by a membrane to the mouth of the ſtomack: and about the fourth *vertebra* of the breſt, it is divided into two branches, the right and the left, which enter into thoſe ſides of the lungs; and ſo the branches encreaſe and grow leſſer, untill at the laſt they end by ſmall twigs, about the ſuperficies of the lungs. They are called *bronchia.* Theſe are framed of a whole circle, being round. Theſe are placed between the branches of *vena arterialis* and *arteria venalis*, to coole the blood: The artery being in the fore-part, the vein in the hinder.

Bronchia.

It hath veins from that branch of the external jugular, which paſſeth to the mouth. Arteries it hath from the great and deep branch of the ſoporal which paſſeth to the throat. Nerves it hath from the ſixth conjugation, called *recurrentes*; becauſe having marched downward, they turn up again to the muſcles of the *larynx.* Two pair of glandules are placed at the ſides of the *layrinx*; the firſt pair is ſeated at the ſides of the *uvula*, about the root of the tongue, They are covered with the common membrane of the mouth; they receive the ſuperfluous humidity of the brain and turn it into ſpittle. They are called

Its veſſels.

Glandules.

tonſillæ, and by Chirurgions *amidalæ*.

The ſecond pair in the lower part of the *larynx* reſt upon the buckler-like cartilage. Theſe in women, by reaſon of their moiſt temperature ſwelling, cauſe their necks to be round, whereas in men, chiefly of a dry complexion, they becomming lank diſcover the protuberance of the fore-part of the *larynx*, which is called *pomum Adami*.

Its membranes.

It hath two membranes; one external and thin from the *pleura* cleaving faſt to the tyes of the cartilages.

The other internal from that which covereth the roof of the mouth, of a thicker ſubſtance having ſtraight fibres and bedewed with an unctuous humour to withſtand ſharp rheums, of an exquiſite ſence; ſo that if but a crum chance to fall into it, it will be like to ſtrangle one.

CAP.

CAP. XI.

Of the action of the Lungs.

THe action of the lungs is called *reſpiratio*, or breathing: this is nothing elſe but the taking in and letting out of the air by the wind-pipe, that the heart the wel-ſpring of the vital heat may be cooled.

The parts of breathing.

Breathing is performed by two actions; to wit, inſpiration and expiration. Inſpiration is performed when the lungs are dilated, for then the air is drawn in; but expiration happeneth when the lungs are contracted, for then the air is compelled.

The blowing of a pair of bellows doth expreſs theſe actions. Dilatation is cauſed by the elevation of the breſt, but contraction by falling down of the breſt. The breſt is dilated by the eleven external intercoſtal muſcles, all which perform the office of one muſcle.

muſcles. Theſe ariſe from the upper rib, and end by an oblique paſſage in the lower rib. The breſt is contracted by the eleven internal intercoſtal muſcles; contrary to the former in their beginning,inſertion,and office: they croſs one another in form of Saint *Andrew's* Croſs; ſo that the motion of the lungs doth proceed from the motion of the breſt. The connexion of the lungs doth make this manifeſt; for above they are faſtened to the neck and back by the wind-pipe; in the forepart to the *ſternum*, behind to the *vertebræ*,by the *mediaſtinum*; below to the midriff by ſome *fibres* which ſpring from the upper membrane of the *pleura*.

CAP. XII.

Of the Neck.

THis part is called *Collum*, not a *Colendo*, becauſe it uſed to be adorned with chains; but

Its denomination

but becauſe it riſeth from the ſhoulders *inſtar collis*, like a hil. It comprehendeth the diſtance between the head and breſt. It was framed for the winde-pipe and mouth of the ſtomack.

Its parts. Containing.

The parts of it are either containing or contained. The containing are the ſame which are found in the reſt of the body, ſaving that the *membrana carnoſa* ſeemeth to be fleſhy.

Contained.

The parts contained are theſe:

1. The *larynx* which is the upper part of the winde-pipe. When the gullet bendeth downeward in ſwallowing, this ſtarteth upward to give way to ſwallowing.

The cartilages of the *larynx*

It is framed of five cartilages: 1. Is *cutiformis*, or buckler-like; for within it is hollow, but without emboſſed; that part which ſticketh out is called *pomum Adami*, and is greater in men than in women. 2. Is *Annularis*, becauſe it is like a Turkiſh ring, and compaſſeth the whole *larynx*; in the hinder part it is broad and thick.

3. And 4: Is *Guttalis*, beccauſe it reſembleth the neck of an ewar: this is doble. They have upper and lower proceſſes; the upper are ſoft, flaggy, bending outwards, being joyned together they are like the neck of an ewar: They make up the *Glottis*.

Glottis. 5. Is in the upper part, and within the *Scutiformis*. It is ſoft, and called *Epiglottis*, becauſe it is placed above the *glottis* or chink, and covereth it. It is of the forme of a tongue. It is appointed to hinder the falling down of any thing which may prove offenſive unto the wind pipe when we eat or drinke. It is preſſed downe by the weight of the things which are taken by the mouth, and turneth them downe to the *gula*. Being ſuſpended by a ligament, being preſſed downe it riſeth up immediatly. 2. Part contained is the mouth of the ſtomacke. It is called *Pharynx* from φέρω, becauſe it conveyeth the meat and drink to the ſtomacke. It is fleſhy. The attraction of it is performed

Epiglottis

Pharynx.

formed by the ſtraight; but the expulſion by the orbicular fibres. 3. Is the *uvula*: It is a red, fleſhy, and fungious ſubſtance. It is covered with the red application of the skin of the roof of the mouth. 4. The ſoporal arteries. 5. The internal jugular. 6. The recurrent nerves between theſe: of all theſe parts the *larynx* is framed for the voice. The remote inſtruments of the voice are the breſt and lungs. The neerer, either prepare as the wind-pipe, or help as the ſinews and muſcles, or keep it as the throat or mouth, or immediatly form the voice, and that is done by the *glottis*; for the air being forcibly blown out of the lungs, it beating upon the chink ſhut reaſonably, procureth the voice.

Vuula.

The ſoporal Artery.

The internal jugulars

The recurrent nerves.

The inſtruments of the voyce.

The living creatures which make no voice have no neck, as fiſhes. The *uvula* cauſeth the pleaſant ſound of the voice: beſides it hath theſe uſes: 1. It ſtayeth the air a little, that it paſs not cold and impetuouſly to the lungs. 2. Like a fanne

What living creatures have no voyce.

fanne it putteth back duſt, and ſuch like bodyes. 3. It hindereth the going up of liquid things to the noſe. If it be deficient, the voice becometh unpleaſant; and the lungs are cooled and made apt to receive defluctions, by the which they are ulcerate, and ſo *tabes* procured.

THE THIRD BOOKE; OF THE HEAD.

CHAP. I.

Of the common parts containing.

Its denomination

NOw followeth the third great venter of the body, called *Caput*, the head; becauſe the ſenſes and nerves take their beginning from thence.

Its ſeat.

It is placed in the higheſt region moſt fit for the ſenſes, but chiefly for the eyes; for they ought to be placed there as in a watch tower; and they having but ſoft ſinewes, which could not endure a long paſſage, it was requiſite that the braine ſhould be at hand.

Its figure Of figure it is ſpericall; yet ſomewhat flattiſh and long.

Its parts. The parts are of three ſorts, for they are diſtinctive or expreſſive of the regions, or conſtitutive of the whole.

The parts diſtinctive are two, the hairy ſcalpe called *calva*, and that without haire called *facies*. The parts which expreſſe the regions, are four: 1. *Sinciput* or the fore-part reaching from the forehead to the coronall ſuture. 2. *Occiput*, the noddle, or the hinder part beginning at the ſuture *lamdoides*, and reaching to the firſt *vertebra* of the neck. 3. And 4. are called *tempora*, or the temples. The laterall parts between the eares and eyes.

The parts conſtitutive are either containing or contained. The containing are either common or proper. The common are *cuticula cutis*, and *membrana carnoſa*: the *cuticula* is thinner and ſofter; but the skin thicker then in any other part of the body, yet *porous* to give way to the nouriſhment of the hair. The *membrana carnoſa* in ſome it ſo cleaveth to the whole skin, that they can move all the skin at their pleaſure: fat was not requiſite, leſt it ſhould have hindered the diſcharging of the fuliginous vapours, and cauſed the heat to be too big.

Cap. II.

Of the Hair.

Its denomination

SEing the skin is garniſhed with hair, I will diſcourſe briefly of it. A hair is a body, cold and dry, ſmall, thred-like, hard and flexible budding from the skin. The hairs are not round, but four ſquare, as the ſtalks of ſome plants. This may be diſcern-ed

Its figure

ned if a haire be put into the opticke inſtrument, called *Jack in a Box.*

The parts of it.

A haire hath three parts, one outward which will admit cleaving: The middlemoſt flexible; and lowermoſt, which is called the root. It is white, and beſet with a mucous ſubſtance, by the which it cleaveth to the skin.

The matter.

Haires are produced, not of the fuliginous excrements of the braine, but of blood drawne by the roots, and beſtowed upon the trunkes; As the feathers in fowles are produced; for if you plucke out any from very young ones, you ſhall manifeſtly ſee that blood doth both produce and feed the haire.

Their ſubſtance

The ſubſtance of the haire is compact, ſolid, and hard, apt to be cleft, according to the length, and laterally flexible.

Their colour.

The colour of them is anſwerable to the naturall conſtitution of the party. They are moſt commonly ſtraight in thoſe which are borne born in cold countries, but curled in thoſe who inhbit hot climates.

They are ſhort and thin in infants, longer and harder in men, but longeſt in women.

Their bigneſs.

The hairs have four uſes; for they ſerve for defence, and beauty, and ſerve for the expulſion of fuliginous vapors, and ſhow the temperature of the whole body and skin.

Cap. III.

Of the proper containing parts.

THe proper containing parts are four; to wit, the muſcles, the *pericranium*, the *cranium*, and the *Meninges*: Look for the muſcles in the treatiſe of the muſcles, and for the *cranium* in the doctrine of bones.

The *pericranium*.

The *pericranium* is a membrane thinniſh and white, immediately ſeated under the *membrana carnoſa*.

It covereth the whole skull, except where the temporal muſcle lyeth upon the *cranium*. It being ſtretched over the temporal muſcle doth firmly binde it. And ſeeing it is moſt tender, it cauſeth horrible pain and inflammation, when the temporal muſcle is wounded. There is no *Perioſtium* beſides it, yet it is double; and being of a competent thickneſs, it may be divided: as all membranes of the like nature.

No *Perioſtium*.

It is tyed to the *dura mater* by ſome nervous fibres, which paſs within the skull, to ſtay firmly the *dura mater*, and ſo the brain from inordinate moving. And although in infants new born theſe be ſtrongly united; yet in proceſs of time they part, and become joyned onely by ſome fibrous tyes; from it to the brain by theſe inflammation may be communicated.

Its connexion.

The Menings follow, called by the *Arabians*, *matres*; as if all the membranes of the body were propagat

The *meninges*.

propagate from them: they are two in number, the *dura* and *pia mater.* The *dura mater* having in the upper ſuperficies of it many veines, it repreſenteth the leafe of a Figtree. It is a little diſtant from the skull, to give way to the motion of it It hath two membranes; the upper towards the *cranium* is harder, rougher, and leſſe ſenſible; becauſe it was to touch the hard skull.

Dura mater

The lower is ſmooth, ſlippery, and as it were, bedewed with water: It hath its beginning from the *baſis* of the skull, unto the which it cleaveth firmely. It hath connexion with the skull and *dura mater*, by nervous fibres. It hath a threefold uſe, 1. It wrappeth in the braine, and the ſinewes proceeding from it, and is a defence unto them 2. It divideth the brain from *cerebellum.* 3. It divideth the braine it ſelfe in two parts, the right and left. This diviſion, by reaſon of the figure of it, being broader in the hinder part; and by

Pia mater

degrees growing narrower is called *falx*, or the *ſicle*.

Pia mater

Tenuis or thin *meninx*, or *pia mater*; It immediatly covereth not only the outmoſt parts of the brain, but the inner cavityes in like manner. It receiveth from the *craſſa meninx* innumerable branches of veſſels, and beſtoweth them upon the braine.

It hath two uſes; Firſt, it keepeth the ſoft ſubſtance of the braine from running abroad. Secondly, it cloatheth the *cerebrum*, *cerebellum*, and the ſinewes. It is of an exquiſite ſenſe to obſerve ſuch things might hurt the braine.

CAP. IV.

Of the nature of the Braine.

The colour of the brain

THE *Pia mater* being taken away, the braine offereth it ſelfe: Which in colour is white, that the animall ſpirits might be clear; which otherwiſe in a dark place of another colour would become leſs clear, and troubled.

Its ſubſtance.

The ſubſtance is thick, viſcous, ſoft, and white. It is not a glandule, for it is the ſeat of the animal ſpirits; but glandules are appointed to receive exerementious humours & it is more curiouſly framed then any glandule: neither is it of a marrowy ſubſtance; for marrow ſwimmeth in water, but this ſinketh. Beſides, the marrow nouriſheth the bones; but the brain nouriſheth no part. The ſubſtance of it differeth from all other parts of the body; as the ſtones do.

The ſubſtance of it doubtleſs, is a *parenchyma*, a ſubſtance oft uſed about the beginning of the nerves; at that of the heart and liver are.

Its bigneſs.

A man of all other living creatures hath the biggeſt brain; for it weigheth four or five *lib.* in ſome; and is as big again as an Oxes brain: for by reaſon of the multitude of the animal function, plenty of ſpirits is required, which cannot be procured, but by great ſtore of blood, which cannot be contained within a narrow place.

The figure of the outer moſt circumference.

The outer circumference is full of windings, as the guts are; that the veſſels being in theſe, as furrows, might ſafely be carried throughout the ſubſtance of the brain to nouriſh it.

CAP. V.

Of the upper region of the Brain.

THe brain hath three parts, *cerebrum*, that which properly is called the brain: the *cerebellum*, the little brain: and that part of the beginning of the *ſpinalis medulla*, which is within the skull.

Its difference from *cerebellum*.

The brain differeth from the *cerebelium*, firſt, in ſubſtance, for it is ſofter; ſecondly, in colour, for it is whiter; thirdly, in bigneſs, for it is three times as big; fourthly, in cavities, becauſe it hath many.

The brain hath three regions; the upper, which is varicous; the lowermoſt which is called *baſis*; and the middlemoſt. The upper part is divided into two parts by the ſicle-like proceſs; to wit, the right and left. In it there is a twofold ſubſtance; for the upper part of it is ſofter, and of an aſh-colour.

Corpus calloſum.

If you take away the three inches broad of this ſubſtance, then the *corpus calloſum* will appear; which is nothing elſe but the whiteſt and moſt ſolid ſubſtance of the brain.

Septum lucidum.

About the bottom of this diviſion of the brain, there appeareth a white ſubſtance, if you bring the ſides gently together with your finger; which is called *ſeptum lucidum*. It is looſe and wrinkled; but if it be ſpred abroad, it appeareth clear. It cleaveth above to the *corpus calloſum*, but below to the *fornix*. Some will have it to be a reduplication of the *pia mater*; others a portion of the brain. Under the *corpus calloſum* the *fornix*, or vault is ſeated of the like ſubſtance. In the upper part it is arched; but in the lower part *convex*. In figure it is triangular. It holdeth up the weight of this upper region from bearing down the ſubjacent part.

Fornix.

CAP. VI.

Of the middle region of the brain.

Under the *teſtudo*, firſt, the ventricres are ſeated, called *ſinus*. They are accompted four in number, whereof two are anteriour; to wit, the right and left; they are ſevered by *ſeptum lucidum*. In the inner part they are covered with a membrane of an exquiſite feeling

Their number. The anterior.

feeling, having its beginning from the *infundibulum* aſcending. Between theſe *ſinus* and the *fornix* there are two textures of veſſels, one on each ſide, framed of the complication of ſmall veins, tyed together by a thin membrane. They are called *plexus chorioformes*: Becauſe they are like to the membrane wherewith the childe in the wombe is wrapped, called *Chorion*.

Plexus choroides.

The third ventricle is nothing elſe, but the meeting of the former two, towards the hinder part. In it there are two paſſages: the firſt in the fore-part, which marcheth ſtraight-waies down to the *infundibulum*. The ſecond paſſeth under the *teſtes* and *nates* to the fourth ventricle. About this there is a chinke called *vulva*.

The poſterior.

The *infundibulum*, or funnell, is a certaine cavity under the third ventricle framed of the *pia mater*, which becomming narrower repreſenteth a funnel. It endeth in the *glandula pituitaria*, which re-

Infundibulum.

Glandula pituitaria.

ceiveth

ceiveth the fleaume falling from the ventricles of the braine. It is placed in the foure-ſquare hollowneſſe of the wedge-like bone.

About this glandule, about the ſides of the aforeſaid cavity there is a membranous twiſting framed of innumerable twigs of arteries; which ſpring from the largeſt branch of the ſoporall artery, which paſſeth by a proper hole in the bones of the temples into the capacity of the *cranium*: It is called *rete mirabile*, repreſenting a net ſpread abroad. *Rete mirabile.*

Here, of the pleaſant breathing of the blood, naturall ſleepe is cauſed; but if the arteries be too full, a deepe ſleepe is cauſed. if you blow up the ſoporall artery in the neck, they will be blown up alſo. Then the *infundibulum*, *glandula pituitaria* and *reta mirabile* are ſeated in the loweſt region, or baſis of the braine.

4. Ventricle. The fourth ventricle is placed betweene the lower part of the *cerebellum* and the beginning of

the *ſpinalis medulla*; and becauſe it being round endeth in a narrow point, it is called *callamus ſcriptorius*.

Callamus ſcriptorius

The chink is cauſed of the diviſion of the root of the *ſpinalis medulla*.

About the hindermoſt hole of the third ventricle, which paſſeth to the fourth ventricle, certain round bodies appear, ſmall portions of the brain, having their denomination from thoſe things which they reſemble. The firſt is *glandula pinealis*, or *penis*; becauſe it repreſenteth the Pine-Nut, or a Prick. It is ſeated in the beginning of that pipe by the which the third and fourth ventricle are united. Neer to this on both the ſides of the third ventricle four round bodies appear. The two upper are leſſer, and are called *teſtes*: the two greater bearings out are called *nates*. The chink between the *nates* is called *anus*. The uſe of theſe ventricles is to carry ſafely the venal blood; for it

Penis.

Teſtes.
Nates.
Anus.
The uſe of the ventricles.

was not ſafe for the veins to be carried through the ſoft ſubſtance of the brain; leſt the veins being compreſſed by the weight of it, the paſſage of the blood ſhould have been hindered.

Nature hath placed the ventricles aloft; becauſe the blood being heavy is apt to paſs down of it ſelf. From the third ventricle innumerable veins paſs by the windings of the brain, to the inner ſubſtance of it. In theſe ventricles onely the venal blood is contained, carried thither by the internal jngulars, which end at the beginning of the lateral ventricles.

CAP. VII.

Of the Cerebellum.

THe ſecond part of the brain is called *Cerebellum*, or the little brain. It is ſeated in the hinder part of the head or skull, unto

Its ſeat.

unto the which it cleaveth by the two membranes wherewith it is wrapped. It differeth from the braine in ſundry points. Firſt, in ſubſtance; for it is harder. Secondly, in bigneſſe; for it is ſcarce ſo big as the third part of the brain. Thirdly, in figure; for it is more flat than round. Fourthly, in cavities; for within it is not hollow. Fifthly, in colour, for it tendeth to a yellowiſh gray colour.

How it differeth from the brain.

It is framed of foure parts, whereof two are laterall, the right and the left: theſe are ſpericall: two are in the middle; to wit, the foremoſt and hindermoſt. Theſe are round.

Its frame

They are framed of ſundry orbicular portions; and becauſe they are like unto the wormes which are in hollow timber, they are called *proceſſus vermiformes*, wormlike *proceſſus*.

Proceſſus vermiformes.

The one is in the fore-part of the fourth ventricle; the other in the hinder part.

Their uſe

Their uſe is to hinder the beginning of the cavity of the *ſpinalis medulla*, by the *cerebellum*.

CAP. VIII.

Of the ſpinalis medulla.

Its name.

NOw followeth the third part of the braine, called *ſpinalis*, or *dorſalis medulla*.

Its ſubſtance.

The ſubſtance of it is not double, as it is in the braine, but uniforme, white, and compact; as it groweth in length it becommeth more and more hard.

Its parts.

It hath two parts; *viz.* that which is contained within the braine, and that which is kept within the *vertebræ* of the backebone. That which is within the skull is about foure inches in length. That which is without, and beginneth at the great hole, reacheth to the *Coccyx*, growing ſmaller, and ſmaller, untill at laſt it end in many ſmall twiſts, which reſemble a horſe taile.

It hath three membranes. The firſt is that which immediatly toucheth it. This ſpringeth from the *dura mater*, and paſſeth between both the parts of it. The veſſels which afford nouriſhment and life, paſſe alongſt this membrane. The ſecond covereth this, and ſpringeth from the *dura mater*. There is no diſtance between, as is ſeen in the braine, but one toucheth another. The third proceeding from the ligament which joyneth together the *vertebræ*, covereth both theſe.

Its membranes.

It is divided all along, as it were by a long ſection untill you come to the *vertebræ* of the loines: you may ſeparate theſe parts by boyling, for then they will fall aſunder. This diviſion is the cauſe that ſometimes one ſide only is paralytick. She *ſpinalis medulla* in figure is round.

Its diviſion.

Its figure

It ſpringeth both from the *cerebrum* and *cerebellum*. Two tootes it hath from the fore-part of the braine,

Its beginning.

braine, about the middle of the ventricles: theſe are in the forepart, and bigger, and are called *nates*. It hath two in like manner which are leſſer, and are called *teſtes*. They ſpring from the lower part of the *cerebellum*. Theſe marching towards the backe-part, meet together, and make the *ſpinalis medulla*.

The hinder trunkes are clipped with a proceſſe; which by *Rawlius* is called *pons cerebelli*.

The common errour concerning the ventricles of the brain

The cavity beteen the *cerebellum*, and the *ſpinalis medulla* is accompted the fourth ventricle, as the vacuity between the *nates* and *teſtes* the third, bnt erroneouſly; for they are not within the ſubſtance of any part of the braine; but are of a neceſſity cauſed by reaſon of the parts aforenamed: So that in truth there are but two ventricles, or rather one parted by the *ſeptum lucidum*; yet for doctrines ſake foure ventricles are ſet down.

CAP.

CAP. IX.

Of the actions of the Brain.

THe action of the brain is this: After that the ſpirits and blood are diſcharged into the *Sinus* of the *dura mater*, by the veins and arteries, to temper the heat of them, the brain is ordained (ſeeing it is colder then the heart) that the animal functions, which are feeling and moving, may be the more readily executed.

Whether the animal ſpirits differ in ſubſtance from the vitall.

Wherefore the animal ſpirits ſeem not to differ from the vital ſpirits in ſubſtance, but in qualities; to wit, the temperament and attenuation; for they muſt be more temperate, because heat doth both taint the reaſon (as we may ſee in drunkenneſs and raving) and hindereth or perverteth the motion.

Why they ought to be temperate

And ſubtill.

The ſpirits ought alſo to be more ſubtil; becauſe they are to paſs, like a thunder, through the bodies of the nerves. So, as the vital ſpirits are carried to the parts of the body by the arteries, ſo the animal are carried by the nerves.

The place of the reaſonable Soul.

The animal ſpirits for this cauſe alſo ought to be ſubtil, becauſe the reaſonable ſoul is reſident in the brain, which doth contemplate things immaterial, as Angels and it ſelf.

CAP. X.

Of the ſinews proceeding from the brain, and firſt of the firſt pair.

Eight pair of ſinews proceed from the brain.

SO much then of the ſubſtance of the brain; It follows then that we ſhew the ſinews which proceed from it; of them there are eight pair comprehended in theſe verſes:

Optica prima; occulos movet alteria; tertia guſtat:
Quarta, & quinta audit; vaga ſexta, at ſeptima linguæ eſt;
Octava olfactum regit, aëre naribus hauſto.

The firſt pair.

The firſt paire, the *optici* or *viſorii nervi* make; theſe beſtow upon the eyes the faculty of ſeeing, They ſpring from the beginning of the trunkes of the *ſpinalis medulla* in the nowle. They march on from thence drawing neerer one to another, untill they meet at the cell of *Os ſphænoides*; where they are united, not by ſimple touching, or interſection, but by confuſion of their inner ſoft ſubſtance. Theſe of all the reſt are biggeſt and thickeſt, but ſofteſt. In their beginnings they are ſofteſt, but become harder, that they may paſſe the more ſecurely ſo long a way.

The hollowneſs of the optick nerves.

Theſe are hollow untill they be united, then the hollowneſſe cannot be diſcerned. This hollowneſſe may be ſhewed in a large beaſt newly killed, and in a cleare light. After their unition they are ſeparate, and each of them, paſſing through the firſt hole of *os cuneiforme*, obliquely are inſerted into the center of the eye.

Their inſertion

Theſe

Their Membranes, and marrowy ſubſtance.

Theſe nerves have two membranes, and the inner ſoft marrowy ſubſtance. The membranes ſpring from meninges. The inner ſubſtance from the body of the braine.

The uſe of theſe nerves.

Theſe nerves cannot be divided into many twiſts, as other nerves are, but frame the tunicles of the eye; for the *cornea* doth proceed from the thick membrane, the *uvea* from the thin membrane, and the *retina* from the marrowy ſubſtance.

CAP XI.

Of the ſecond and third Pair.

The ſecond pair.

Its beginning.

THE ſecond paire is termed *motorium oculorum*, becauſe it moveth ſome muſcles of the eyes. It hath its beginning about the innermoſt part of the beginning of the *ſpinalis medulla.*

Why both the eyes are directed to the ſame object.

Theſe ſinewes are ſo united where they ſpring out, that they make a common corner, which is the cauſe that both the eyes turn to the ſame parts.

Its ſubſtance.

It is ſmaller and harder then the former, and cometh out of the skull by the ſecond hole of *os cuneiforme*, which is long; and ſo entereth into the orbick of the eye.

Its ſprigs

It hath ſundry ſprigs: the firſt mounting above the optick, it is beſtowed upon the attollent muſcle, and the eye-lid. The ſecond eaſie to be ſeen, is beſtowed upon the adducent muſcles, by ſundry ſmall twigs. The third by many *fibres* is inſerted into the depriment muſcle. The fourth is inſerted into the leſſer oblique muſcle, about the outer corner. So that this pair onely moveth four muſcles.

The thirdpair Its beginning, marching, and inſertion

The third pair proceedeth from the lower part of the root of the *ſpinalis medulla*, in the beginning, being very ſmall; from thence it marcheth directly forward under the *baſis* of the brain, accompanying the ſecond pair, with the which it paſſeth through the ſecond hole of the wedge-like bone, and entereth into the orbit of the eye. Then it is divided into four branches: the firſt beſtoweth a branch upon the greater oblique muſcle, which hath the *trochlea*: Then paſſing through the hole of *os fontis* above the orbit, it is beſtowed upon the muſcle of the eye-brow and the skin. The ſecond marcheth downwards, and paſſing through the hole of the upper jaw-bone, which is under the orbit, is beſtowed upon the muſcles, opening the upper lip and noſtrils, as alſo the gums of the inciſory teeth of the lower gum. The third paſſing by the hole of the ſecond bone of the upper jaw, which is under the caruncle of the great corner, is beſtowed upon the inner membrane of the noſe. This being very ſenſible cauſeth ſneeſing if any ſharp thing toucheth it. The fourth cometh out of the fourth hole of *os ſphænoides*,

Its branches

The cauſe of ſneezing

noides, which is the chink neer to the outward corner of the eye, and goeth to the inward part of the temporal muſcle. This beſtoweth the faculty of moving to the forenamed muſcle.

CAP. XII.

Of the fourth and fift pair.

The fourth pair.

THe fourth pair ſpringing neer the place of the former, paſſeth through the ſixth hole of the wedge-likebone; and paſſing downward, it is divided into three branches; the firſt being twiſted, it is united into two twigs of *nervus auditorius*, and is beſtowed upon the muſcles of the cheeks and lower jaw. The ſecond is inſerted into the gums of the grinders of the upper jaw. The third entereth into the hollowneſs of the lower jaw, and beſtoweth a twig to the roots of all the teeth. It endeth in the skin of the

Its branches.

Its ending.

the lower lip, and the membrane of the tongue neer the root. Ordinary Anatomiſts make but one pair of theſe two laſt, and ſet it down their third; but theſe two are united neither in their beginning nor inſertion.

The fifth pair. Its beginning.

The fifth pair proceedeth from that place where a portion of *cerebellum* is united to the brain, lengthned by two nerves; whereof the one is ſofter, the other harder. Theſe paſs out of the membrane together; and by the hole of *os petroſum* enter into the wreathed hollowneſs of the ear.

Its twigs. Why they that are born deaf prove dumb.

The harder ſendeth twigs to the throat, noſtrils, and a twig to the tongue. By reaſon of this twig they that are born deaf prove alſo dumb.

The ſofter nerve when it is come to the firſt cavity of the ear, it covereth it like a membrane; and truly may be called *nervus auditorius*, ſeeing it doth afford the ſpirits to the hearing.

CAP. XIII.

Of three other paires.

THE ſixth paire is called *vagum*, becauſe it beſtoweth branches upon ſundry parts; and amongſt the reſt, to all parts of the belly which require feeling; for theſe being ſoft parts did not require hard ſinewes from the *ſpinalis medulla*.

The ſixth pair. Its inſertion.

This ariſeth from the hinder and lower part of that place, from whence the former ſprung, by many ſmall twigs. Theſe make up two diſtinct nerves, which are covered with one membrane borrowed from the *dura mater*. So joyned, they paſſe through the ſecond and third hole of the nowle, by the which the leſſer branch of the ſoporall artery, and the greater of the jugular enter into the skull.

Its beginning.

The leſſer of theſe branches is ſeated more forward, and when it is come

Its branches.

come out of the skull it is ſpent upon the muſcles of the throat & tongue, and the parts contained within the mouth. The greater is ſeated more backwards. This before it enter into the breſt; above the throat, it is divided into two branches; to wit, the Exterior which is leſſer, and the Interior, which is greater.

Their current nerves.

From the Exterior thoſe nerves doe ſpring, which are called *recurrentes* or *reverſivi*, becauſe they deſcend and aſcend againe; and *vacales*, becauſe they being cut, hinder the voice.

Of theſe the right is winded about the axillar artery, as about a pulley. The left is wound about the *aorta* deſcending; afterwards mounting up, they are inſerted into the beginning of the muſcles of the larynx, which are in the lower part. This Exterior is beſtowed upon the parts of the middle cavity. The Interior branch is beſtowed upon the parts of the abdomen. The right ſprig ſerving for theſe in the right ſide, and the left ſerving thoſe in the left.

The ſeventh pair. The ſeventh pair, which affordeth moving and feeling to the tongue, is hardeſt of all.

Its beginning. It hath its beginning where the *cerebellum* endeth, and *ſpinalis medulla* beginneth.

Its frame. In its beginning it hath divers ſprigs, which afterward are united & paſs through the fourth and fifth holes of the nowle; which are placed between the great hole; by the which the *ſpinalis medulla* paſſeth; and that out of which the ſixth pair iſſueth. As ſoon as it is come out, it is united to the ſixth pair by a membrane. When it is come to the root of the tongue, it beſtoweth moſt branches upon the muſcles of the tongue, but feweſt upon thoſe of the *larynx*.

The eighth pair. The eighth pair may be called *Olfactorium*, becauſe it ſerveth for ſmelling. They ariſe at the hinder ſides of the brain, which are above the holes of hearing. They are ſharp in their beginning, and ſeparate: They end in the *proceſſus mammillares*, or *papillares*. In number they are two, white, ſoft, broad, long. In man they are but ſmall; but in beaſts of exquiſite ſmelling (as Hounds) large.

CAP. XIV.

Of the nerves of the ſpinalis medulla; and firſt of the nerves of the Neck.

What it is.

OUt of the *ſpinalis medulla*, which is nothing elſe but the production of the *cerebrum* and *cerebellum*, by the *vertebræ* of the back do ſpring all the ſinews which move all the other parts of the body.

Its membranes.

The Nerves which ſpring from it.

The *ſpinalis medulla* hath three membranes, two as the brain, one harder, the other ſofter, and the third membranous and ſtrong, which *Galen* took to be the ligament of the *vertebra*. From it do ſpring thirty pairs of ſinews; ſeven of the neck, twelve of the breſt, five of the loines, and ſeven from the holes of *os ſacrum.*

The firſt pair. The firſt pair in the fore-part commeth out between the nowle-bone and the firſt *vertebra* of the neck, and is beſtowed upon the muſcles which bend the neck, which lie under the *œſophagus.* In the hinder part it commeth out of the hole, which is common to the nowle-bone, and the firſt *vertebra* of the neck.

Its twigs. It hath two twigs: The ſmaller is beſtowed upon thoſe which ſtretch out the neck. The bigger is inſerted into the beginning of the muſcle which lifteth up the ſhoulder-blade.

The ſecond pair. The ſecond pair in the fore-part, where it is ſmalleſt, it commeth out between the ſecond and third *vertebra*, and is beſtowed upon the skin of the face. In the hinder part it commeth out at the ſides of the proceſs of the ſecond *vertebra*, but preſently it is parted into two twigs. The thicker is be-

beſtowed upon the whole skin of the head, even to the crowne. The ſmaller is beſtowed upon greater, ſtraight, and the lower oblique muſcles which ſtretch out the head.

The third pair.

The third paire commeth out of the laterall hole, which is betweene the ſecond and third *vertebra*, and immediately is divided into two branches; whereof that which in the fore-part, hath foure twigs: the firſt commeth to the long muſcle; The ſecond is beſtowed upon the muſcles which ly under the *æſophagus*; The third goeth to the skin of the back-part of the head. The fourth is beſtowed upon the tranſvers muſcles of the neck, and the muſcle which lifteth up the ſhoulder blade; The hindermoſt branch is beſtowed upon the ſecond paire which heaveth up the breſt.

The fourth pair.

The fourth paire commeth out of the hole common to the third and fourth *vertebra*, and hath two branches: The foremoſt hath three twigs. The firſt is beſtowed upon thoſe which bend the necke. The ſecond is beſtowed upon the tranſvers muſcle of the necke, and the *cucullaris* of the ſhoulder blade. The third goeth to the ſinewy part of the midriffe. The hindermoſt branch goeth to the backe-bone under the muſcles of that part, upon which it beſtoweth twigs.

The fifth pair.

The fifth paire marcheth out between the fourth *vertebra*; and hath two branches. The foremoſt hath foure ſprigs; the firſt goeth to thoſe that bend the necke: the ſecond goeth to make *nervus phrenicus*: the third to the *Deltoides*: the forth goto the *deltoides*, and to the *Coracohyoideus*: The hindermoſt branch goeth to the *ſpina*, and is beſtowed upon the muſcles there.

The ſixth pair.

The ſixth paire commeth out under the fifth *vertebra*, and hath, as the reſt, two branches: The foremoſt ſendeth firſt one ſprig to make *nervus phrenicus*: then it goeth to the arme: The ſecond branch goeth to the muſcles behinde which ſtretch out the neck and head.

The ſeventh pair.

The ſeventh paire commeth out of the hole common to the ſixth and ſeventh *vertebra.* The foremoſt and largeſt branch is carried to the arme. The hindermoſt and ſmalleſt is beſtowed upon the muſcles of the necke, and quadrat muſcle which pulleth downe the cheeke.

CAP. XV.

Of the nerves of the vertebra of the Breſt.

FRom the marrow of the *vertebra* of the breſt, twelve paires doe ſpring. In all of them, the foremoſt branch is biggeſt ; but the hindermoſt, which is beſtowed upon the muſcles ſeated in the back, ſmalleſt.

The firſt pair.

The firſt, ſpringeth out of the hole which is common to the ſeventh *vertebra* of the neck, and the firſt of the breſt. The foremoſt branch marcheth upwards towards the *ſternum*, and beſtoweth a twig of *muſculus ſubclavius*, and thoſe which ariſe from the *ſternum*; and that which from the hollowneſs of the ſhoulder-blade. The hindermoſt branch, lurking under the muſcles which cleave to the *vertebræ*, is beſtowed upon the muſcles of the neck, head and ſhoulder-blade.

The ſecond pair.

The ſecond iſſuing out of the place between the firſt and ſecond *vertebra* of the breſt, paſſeth to the arms, and produceth the firſt intercoſtal nerve; from whence twigs paſs to the muſcles ſeated upon the breſt; both the foremoſt and hindermoſt branch have the ſame diſtribution.

The reſt of the pairs.

The reſt of the ten paires come out of the lateral holes of the *vertebra*, and immediatly are divided in two branches; whereof the foremoſt being larger, make up the intercoſtal nerves; and being joyned with the intercoſtal veines and arteries, and received into the groop of the lower part of each rib. The hindermoſt march towards the back-bone, amongſt the muſcles which cleave to the *vertebra*, and ſerve for the ſtretching out of the breſt.

CAP. XVI.

Of the ſinews of the marrow of the vertebra of the loyns.

The firſt pair.

ALthough there be but four lateral holes in the *vertebra* of the loynes; yet there are five pairs of ſinews. The greater foremoſt go to the muſcles of the belly. The hindermoſt goe to thoſe which reſt upon the *vertebræ*. The foremoſt are tied together, the firſt with the ſecond, the ſecond with the third, the third with the fourth, and the fourth with the fifth.

The firſt commeth out of the lateral

laterall hole between the laſt *vertebra* of the breſt, and the firſt of the loynes: the formoſt branch is beſtowed upon the fleſhy part of the midriff, and the muſcle *Pſoa.* It ſendeth alſo a twig by the *arteria preparans* to the ſtone. The hindermoſt is beſtowed upon the *muſculus longiſſimus* and *ſacrolumbus.*

The ſecond commeth out between the firſt and ſecond *vertebrá* of the loynes. The formoſt branch is beſtowed upon the *muſculus faſcialis*, and the skin of the thigh. The hindermoſt is beſtowed upon the *muſculi glutǽi*, and the membranous muſcle which ſtretcheth out the leg. 2.

The third marcheth out between the ſecond and third *vertebra*, The formoſt ſendeth one twig to the knee and skin thereof, and another which doth accompany the *ſaphena.* The hindermoſt turneth back, and is beſtowed upon the muſcles which reſt upon the loyns. 3.

The fourth being the largeſt of 4.

the muſcles of the loynes marching under the *os pubis*, doth accompany the veine and artery, which paſſe to the leg.

The fifth commeth out between the fourth and fifth *vertebra*, and is beſtowed upon the *obturatores muſculi*, and the muſcles of the pricke. The hindermoſt is beſtowed upon the muſcles and skin which are above the *vertebra*.

CAP. XVII.

Of the nerves which come from the marrow of os ſacrum.

The firſt pair.

FRom the marrow of the *os ſacrum* ſix paires of ſinewes ſpring.

The firſt iſſueth out between the laſt *vertebra* of the loines, and the firſt of *os ſacrum*. The foremoſt branch of it is beſtowed upon the muſcles of the belly, and the ſecond which bendeth the thigh. The hindermoſt is beſtowed upon the skin of the buttocks, and the greateſt *glutæus.*

Of the otherfive pairs.

The other five pairs on each ſide have two pairs, whereof the firſt three go to the legs. The ſecond under theſe are beſtowed upon the muſcles of the bladder and fundament, to the neck of the matrix in women, and to the prick in men. The laſt are ſpent upon the muſcles of *os ilium*, and *ſacrum* towards the back part; which are *longiſſimus*, *ſacrolumbus*, *ſacer*, and the *glutæi*.

CAP. XVIII.

Sheweth how the brain is to be diſſected.

THe brain is to be divided in three parts; to wit the uppermoſt, the middlemoſt, and lowermoſt part.

In the uppermoſt, theſe parts are to be ſeen; the windings, falx, and *corpus calloſum*.

In the middlemoſt under the *fornix*, behold the ventricles, the *plexus choroides*, and *cerebellum*.

In the lowermoſt you ſhall finde the *infundibulum*, the glandules under it, *proceſſus mammillares*, eight pair of ſinews and the roots of the *ſpinalis medulla*.

CAP. XIX.

Of the outward parts of the eye.

Of the face.

WEE have ſpoken of that part which is decked with hair: Now we are ſpeak of that part which is not altogether garniſhwith hair. In Latin it is called *facies*, in Engliſh, Face, becauſe it cauſeth every one to be diſcerned who he is.

The parts of it. The common

The parts of it are either common or proper: The common are, *cuticula*, *cutis*, *adeps*: it hath no *membrana carnoſa*, for it endeth in the chin, and the fat is onely in the places between the muſcles. The parts

The proper.

parts proper are either containing or contained. The parts containing are the muſcles and bones, which are ſet down in their proper places. The parts contained are the inſtruments of the four Senſes, to wit, the eye, the ear, the noſe, and mouth. Firſt then of the eye, partly becauſe without ſight the life is tedious; partly becauſe the object of it is moſt ſubtil. They are in number two; Firſt to look aſide. Secondly, to ſee by one if the other be loſt. Thirdly, to ſee more diſtinctly and clearly.

Why the eye is firſt to be handled.

Why two.

Their figure.

Their ſituation.

In figure they are round: firſt, becauſe this figure is moſt capable of the multitude and bigneſs of the objects, and fitteſt for quick motion. They are ſeated high, the better to eſſay, & to govern motion which is foreward.

Its parts. The externall. The eye-brow.

The parts of eye are either external or internal. The external are in number four. Firſt, the eye-brow, the ſeat of diſdain and pride. It is framed of the skin, muſcles, fat, and hair. The skin is thick and hard to hinder the immoderate growing of hair. It is oblique, the better to turn away thoſe things which might fall into the eye. Secondly, the eye-lid; in man the uppermoſt is biggeſt, and moveth; but in birds the lowermoſt is biggeſt, and moveth.

The motion of the eye-lids.

The hair called *cilia* in the upper lid turn upwards, but in the lower downwards, that they ſhould not offend the eye and ſight. They repel ſmall bodies from entring into the eye.

The hairs of the eye-lids.

It is framed of the skin; the muſculous fleſh, and a griſly welt, which keepeth the *cilia* from growing. Thirdly, the corners, the greater is toward the noſe, the leſſer towards the temples. Fourthly, *caruncula lachrymalis*, the glandule in the greater corner, ſeated before the hole which paſſeth into the noſe. In it are the holes by the which the tears iſſue. In it is ſeated the *fiſtula* of the eye.

The frame of the eye-lid.

The corners.

The glandule

CAP. XX.

Of the tunicles of the eye.

The uſe of the fat

THe inner parts are in number five the firſt is the fat, which firſt defendeth the eye from cold: ſecondly, keepeth is from the hardneſſe of the bone: Thirdly, moiſteneth the eye: Fourthly, filleth the diſtance between them. Secondly, the ſixe muſcles, which are ſet downe in their proper place. Thirdly, the tunicles, whereof the firſt is called *conjunctiva* and *adnata*; becauſe it cleaveth firmly to the eye, and keepeth it within the *orbita*, that it ſtart not out in violent motions. It covereth the halfe of the eye orbicularly, but it ſpringeth from the *pericranium*. The ſecond is *cornea*, becauſe it is like to a Lanterne horne in firmeneſſe and brightneſte; it may be ſevered into many skins. In the fore-part it is thinner and brighter; but in the hinder-part thicker and,

The muſcles.

The tunicles.

and darker. It is thin, that the *viſibiles ſpecies* may the more readily be carried to the criſtallin humour. It is ſmooth alſo: for if it were wrinckled it would have hindered the ſight. It ſpringeth from the *dura mater*. The third is *uvea*, becauſe it 3. is like to thehuske of the black grap, for in colour it is not unlike, and ſmooth without, and rough within. It is of ſundry colours, the better to apprehend colours. The inner ſide is blacke, that a weake light might the better be ſeen by the criſtallin; for light in a darke place ſhineth the more brightly. It ſpringeth from the *pia mater*. In the middle it is perforate, which maketh the *pupilla*: this is nothing elſe but the hole of *uvea*. The circle about the *pupilla* may be ſeparated from the *uvea* in an Oxes eye boiled. Fourthly, *Criſtallina*; it is a membrane thin and cleer, compaſſing the criſtalline humour thinner before than behinde. Fifthly, *vitrea*; it is very thin, white, and ſmooth: If it be

The *Pupilla.*

4. The cryſtallin.

5.

be cut, the *vitreus* humour iſſueth out.

CAP. XXI.

Of the humours of the Eye

THe humours make up the fourth internal part. They are in number three; *aqueus*, *criſtallinus*, *vitreus*. 1. The firſt is the wateriſh humour, ſo called, becauſe it runneth as water; it hath no tunicle, it not onely filleth the cavity between the *cornea* and the criſtallin humour; but compaſſeth alſo the vitreous humour; for if you cut the eye behind, it will as well run out there as before. The wateriſh humour is kept together by ſome ſmall thred-like ſubſtances. They are under the circle of the *uvea*, and by reaſon of them the cataract groweth. This texture of filaments is by ſome called *tunica ciliaris*, ſo called, becauſe they are black and like to the

Where the cataract groweth.

the eye-brows, but improperly, 2. The ſecond is the Cryſtallin humor, ſo called, becauſe it reſembles a Cryſtal or Ice; it is of a compact wateriſh ſubſtance. It is plain before, that there might be a competent ſpace for the receiving of the viſible reſemblances; for the which uſe a round figure was not fit; yet it is plain behind, where it ſticketh in the humour vitreous. It cauſeth every thing to ſeem bigger. It is placed not in the middle of the eye, but neer to the *pupilla*. 3. The third humour is the *vitreous* or glaſs-like humour; for it is like to moulten glaſs. It is placed behind, that if any thing ſhould eſcape the Cryſtallin humour, it might be ſtayed there, and not return to the *uvea*. It receiveth the Cryſtallin humour as a ſoft pillow, wherefore it is ſofter then it. It is more copious then the other two; it is ſtayed by ſome filaments; theſe being by inciſion ſeparated, the glaſs-like humour runneth as water. The fifth internal ternall part the veſſels make. The externall veines proceed from the externall jugulars; the internall from the *plexus coroides*. The externall arteries ſpring from the externall ſoporals; but the internall from the *rete mirabile*. There be two nerves appointed for each eye, one for motion called *motorius*; the other for ſight called *viſorius*, this is ſofter.

The fifth internal part.

Cap. XXII.

Of the Auricula.

NOW followeth the inſtrument of hearing, the eare. The eares are two, that the one failing, yet we might heare with the other. They are placed in the head, becauſe ſounds aſcend, and becauſe we have alwaies need of this ſenſe.

The parts of it.

The parts of the eare are either outward or inward. The outward is called *auricula*; of it ſome parts are common, ſome proper. The common are, *cuticula*, *cutis*, *membrana nervea*, *caro*, and fat in the lobe. The skin is thin; under it there is ſmall ſtore of fleſh, which is tyed to the cartilage by a membrane. The lobe, by reaſon of the fleſh and fat, ſeemeth fleſhy, and fatty. The proper parts of the *auricula* are the muſcles, veines, arteries, ſinewes, and the cartilage. As concerning the muſcles, they are ſet downe in their proper treatiſe. The veines come from the externall jugulars; the arteries from the ſoporals; the nerves from the ſecond paire of the neck. The cartilage was fitteſt for this place. If a bone had been here, it had been troubleſome, and eaſily broken: if fleſh, it had been ſubject to contuſion, and could not have repelled the ſound. It is tyed to *os petroſum* by a ſtrong ligament, which riſeth from the *pericranium* to ſtay it up.

Its uſes. The uſes of the outward eare are theſe: firſt, it ſerveth for beauty.

Secondly,to help the receiving of the ſounds the more readily: for firſt, it gathereth them, being diſperſed in the aire. Secondly, it doth moderate them, that they come gently to the *tympanum*. The haire here hindereth the creeping in of infects.

Cap. XXIII.

Of the inward parts of the eare.

THE inward eare is framed of foure cavities, and their furniture. The firſt is, *meatus auditorius*, which is alwaies open; it hath windings, leſt the air ſhould ſuddenly ruſh in upon the *tympanum*. It is oblique; to abate the vehemency of a ſound. It marcheth upwards, that if any thing ſhould goe into it, it might the more readily fall out. It endeth at the *tympanum*, and containeth the eare-wax, by the which the braine is purged, and infects hindered from creeping in, entangling them as birdlime. It endeth at the *tympanum*.

The drum.

This membrane is very dry, that it might give the better ſound. It is thin and clear, that the ſounds may be the more readily ſent to the internall aire. It is ſtrong that it ſhould the better endure externall harmes. It hath a cord for ſtrength and ſtretching of it, even as the Military Drum hath. The ſecond cavity by *Veſalius* is called *pelvis*, the tunel, by *Fallopius conchia*, the perwinkle, from its figure.

Pelvis.

The uſe of the things contain'd in it.

The furniture of this cavity ſerves for three purpoſes, for motion, for tranſmiſſion of ſounds, and for the expurgation of the excrements; for motion, the three little bones, the ligament and muſcles doe ſerve. ;The little bones are in number three; the firſt is *malleolus*, the little hammer. It hath a thick and long head, cleaving to a narrow and ſmall necke. It hath a ſmooth cavity to be articulate with the anvil. It hath two proceſſes

The three little bones.

1.

ceſſes ſpringing from the neck; unto the upper, which is leſſer and crooked, the corde of the Drum cleaveth. The membrane reſteth upon the lower. The ſecond is *Incus*, the anvil, having a head and two feet. The head is ſomewhat thick. In the top of it there is a ſmooth cavity which receiveth the knob of the hammer. The ſmalleſt and longeſt foot is tyed to the top of the ſtirrop; but the thickeſt, broadeſt, and ſhorteſt reſteth upon the *os ſquamoſum* of the temple. The third is *ſtapes*, or or the ſtirrop. In figure triangular, in the middle hollow, to give way to the paſſing of the air to the *labyrinthus*. In the upper part of it, is a very ſmall and round knop, upon the which the longeſt foot of the anvil reſteth; the *baſis* is ſet to the oval hollowneſs, and the membrane ſhuteth it. 2. 3.

Theſe bones have no *perioſtium*, for then they would be unfit to return any ſound. Secondly, they have neither cartilage nor marrow,

The qualities of theſe bones.

row, for they muſt be hard. Thirdly, in infants they are as perfect and as big as in men. Fourthly, they are placed up by a ligament, that being ſhaken by the internal air, moved by the external, the ſharper ſound may be cauſed.

Its uſes.

Theſe bones have theſe uſes; Firſt, they ſtrengthen the *tympanum*; therefore the hammer with one of the feet of the anvil lean upon the Drum. Secondly, by ſhaking of the *tympanum*, they moved bring the better the ſound to the auditory nerve. Thirdly, they further the receiving the diverſity of ſounds, as the teeth the diſtinction of words. Laſt of all, for motion the muſcles are appointed: one is without the drum, above in *meatus auditorius*, whoſe tendon is inſerted into the *tympanum*, againſt which the *malleolus* is inſerted to draw it outwards together with the hammer. The other is within the Drum in *os petroſum*, inſerted by a double tendon in the hammer to draw it back.

The third cavity.

The third cavity is called *labirynthus*, becauſe it hath ſundry windings. There are ſixe ſemicircles in this cavity. The end of theſe windings is to mitigate the ſound which was redoubled within the *concha*, as an eccho.

The fourth cavity.

The fourth cavity is called *cochlea*, or a wilke, ſo called, from the figure; for it hath three, ſometimes foure wreathings: within there is a chinke, by the which the ſound paſſeth to the braine, and the bilious excrement falleth into the aire.

How the hearing is cauſed.

The hearing is thus cauſed, The aire paſſeth through the firſt cavity, and gently beateth upon the drum, which being ſhaken, toſſeth the three bones joyned to it. Then the kind of ſound is impreſſed into the inward aire, which having the quality of the ſound, and being circulate through the windings of the labirynth to make it purer, is conveyed by the *chochlea*, and delivered to the auditory nerve that the animall ſpirit may preſent it to the common ſenſe, the judge of all ſpecies.

CAP. XXIV.

Of the Noſe.

THE inſtrument of the third
ſenſe, ſmelling, enſueth, to wit-
the noſe. The parts of the noſe are
either externall or internall. The ex-
The externall parts. ternall parts are theſe, the skin, the
muſcles, the veines, arteries, nerves,
1. bones, and cartilages. Firſt, the skin
cleaveth ſo faſt to the muſcles and
cartilages, that it cannot be ſevered
without renting. Secondly, as for the
2. muſcles, they are ſet downe in the
3. deſcription of muſcles. Thirdly,
the veines come from the externall
jugulars, as the arteries from the
4. ſoporall Fourthly, the ſinewes
come from the third paire, on each
5. ſide one. Fifthly, the bones of the
noſe are ſet downe in the doctrine
6. of bones. Sixthly, the cartilages
are

are in number five; the two upper make up the half of the *Alæ*, the two under make up the other half; the fifth diviſion the noſtrils: the cartilages are onely moved by the muſcles.

The inner parts.

The inner part of the noſe, are theſe: Firſt, the membrane which covereth the inſide of the noſe, which proceedeth from the *dura mater*, and paſſeth through the holes of the *ethmoides* bone. Secondly, the muſculous membrane, which draweth together the noſtrils. Thirdly, the the hairs which diſperſe the air, and hinder the creeping in of inſects. Fourthly, the red fleſhy ſpongious ſubſtance, with which the holes of the *ethmoides* are filled up; from this the *polypus* ſpringeth. The length of a comely noſe is the third part of the length of the face. The upper part of the noſe which is bony, is called *dorſum naſi*, the ridge *ſpina*. The lateral parts where the cartilages are, *alæ*, *pinnæ*; the tip of the noſe *globulus*, *orbiculus*, *pynula*. The fleſhy

The denomination of ſome parts.

part next to the upper lip, *columna*.

Its uſes.

The uſes of the noſe are theſe; Firſt, by it the air is ſent to the brain, for the generation of the animal ſpirits. Secondly, the lungs by it draw in air for the refreſhing of the heart, and the generation of the vital ſpirits. Thirdly, ſmels by it are carried to *proceſſus mammillares*. Fourthly, by it the brain diſchargeth its excrements. Fifthly it furthereth the ſpeech. Sixthly, it beautifieth the face. Seventhly, it parteth the eyes, that the one ſhould not ſee the other, which would have hindered the ſight. Eightly, it is a defence to them alſo, and ſtayeth the viſible reſemblances. Ninthly, by fleering up, it expreſſeth anger, ſo that in the Hebrew tongue it ſignifieth anger.

Cap. XXV.

Of the Lips.

Now laſt of all, followeth the mouth, wherein is contained the tongue the inſtrument of taſting. The uſe of it is fourfold; for it ſerveth for breathing, taking of food, ſpeaking and diſcharging of the excrements of the brains, lungs, and ſtomack.

The externall parts of the mouth.

The parts of the mouth are either external, or internal: The external are the lips; theſe are framed of a fungious ſubſtance, and the ends of the muſcles covered with the skin: They are in number two, the upper and the lower. Of the muſcles of the lips, ſufficient is ſpoken in the proper place. The lips within are covered with a membrane common to the mouth and ſtomack; and from hence commeth the trembling of the lower lip before vomiting. The parts which touch one another are red, by reaſon of the afflux of blood. The colour of theſe are diligently to be obſerved in diſeaſes.

The uſes of the Lips.

The uſes of the lips are theſe: Firſt, they ſerve for the conveniency of eating and drinking. Secondly, for the beautifying of the face, if they be well faſhioned. Thirdly, for the containing of the ſpittle in the mouth, that it ſhould not run out at unſeaſonable times. Fourthly, to keep the gums and teeth from external injuries. Fifthly, for framing of the ſpeech. Sixthly, for kiſſing.

CAP. XXVII.

Of the inner parts of the mouth.

THe inner parts of the mouth are theſe; The gums, the teeth, the *palatum*, or roof of the mouth, the almonds, the *uvula*, and tongue. 1. The gums, they are fleſhy ſubſtances,deſtitute of motion, appointed for the keeping of the teeth in their ſockets. As for the teeth,look for them in the doctrine of bones. The roofe of the mouth is vaulted, that the aire being repercuſſed, the voice may be the ſharper. The skin there is wrinkled and rough, that the white hard membrane ſhould the more firmly cleave to the bone,and keep the meat together while it is a chewing. Of the almonds, and *uvula* we have ſpoken in the diſcourſe of the neck. The laſt of the inner parts is the tongue: In figure it is pyramidal: it is compoſed of fleſh, muſcles, ligaments, and the skin that covereth it. The skin that covereth it is of an exquiſite ſenſe, and proceedeth from the *dura mater*. The fleſh is ſpongious, and ſuch as is not in any parts of the body; that it might receive the qualities of ſapors, and judge of them the better. From hence it commeth, that it doth imbibe the fumes and vapors of the humours

2.

3.

4,5.

6 The tongue. Its parts.

Its motion.

predominant in the body, which by its colour it doth declare. The tongue moveth forward, backward, to every ſide; it is contracted, thruſt out, and doubled. Look for the muſcles appointed for theſe motions in their proper place. Although it ſeem but one continuall member, yet it is divided into two parts by a line going alongſt it. And in the palſey of one ſide of the body, one halfe of the tongue may be affected, the other remaining ſound. Of the ligaments, the lower, which is called *frænum*, as in the pricke, is moſt remarkable: By this part, Nature ſheweth that moderation is to be obſerved in the uſe of theſe members. If this ligament be extended to the top of the tongue, it hindereth ſucking in children, ſo that they are ſaid to be tongue tyed. The veins proceed from the externall jugulars under the tongue, they are called *ranulares*, from their colour. The arteries come from the ſoporalls. Sinewes it hath from the third and ſeventh

Its diviſion.

The cauſe of tongue-tying in children.

The veſſels.

Its uſes.

ſeventh pair. The uſes of the tongue, are theſe; Firſt, it is the inſtrument of taſting: Secondly it uttereth the ſpeech: Thirdly, it helpeth the chewing of meat, by toſſing of it too and fro, and turning it down to the ſtomack. Fourthly, it ſerveth for licking, from whence in Latin, it is called *lingua à lingendo* from licking.

THE FOURTH

BOOKE.

A deſcription of the Veins, Arteries, and Sinews of the Limbs.

CHAP. I.

Of the veines of the Arms.

Ramus ſubclavius, or the branch of the *vena cava*, aſcending under the cannel-bone, when it is come to the arm-pit, it is called *axilaris*; and it parteth it ſelf in two veins, the *cephalica*, and *baſilica*.

The *cephalicæ* in beaſts doth wholly ſpring from the externall jugular; but in man it receiveth onely a ſpring from the externall jugular. Wherefore in diſeaſes of the head, it is not without cauſe opened. It paſſeth through the upper and outward parts of the arme, to the bending of the elbow, where it is divided into two branches; of the which one, joyning with a branch of the *baſilica*, makes the *mediana*. Wherefore the ſlope branches, which uſually are opened about the bending of the elbow, are only branches of the *cephalica*, and *baſilica*, which meeting; make the *mediana*. The other branch of the *cephalica* marching, according to the length of the *radius*, reacheth to the hand, through which it is ſpred; but chiefly that part which is between the ring-finger and the little finger.

There the *Salvatella* is placed, which is to be opened in melancholy diſeaſes. The *baſilica* paſſeth through the inner and lower part of the arm, accompanied with the artery and nerves.

About its beginning it maketh the *thoracica*, which having three or foure ſprigs, and paſſing under *ſerratus major*, and the ſubſcapular muſcle, it is tyed to the upper intercoſtall, and about the *ſpina dorſi* is inoſculate with the twigs of *vena ſine pari*. *Baſilica* about the bending of the elbow is divided into that which is called *ſubcutanea*, and that which is called *profunda*.

Profunda the deeper, is annexed to the artery about the bending of the elbow, not under. Then paſſing between the focils, it is carried to the hand by the outer part of the *ulna*.

The *ſubcutanea* or the ſhallowest branch neer to the bending of the arme, being turned up to the outer part of the *ulna*, by the length of it, is it carried to the hand.

The *Mediana* paſſeth to the

inſide of the hand by the middle part of the *ulna.*

CAP. II.

Of the Arteries of it.

R*Amus ſubclavius* ſo called, as that of the *vena cava*, when it is come to the arme-pits; it is called *axillaris.* It accompanieth the *baſilica*: for there is no cephalicall. Neer to the arm-holes, it yeeldeth that artery, which is called *thoracica*, from thence being carried to the bending of the arme, it is parted into two branches, which paſſe to the inner ſide of the hand; for the outſide of the hand hath neither muſcles nor artery.

The one of theſe reſting upon the *radius*, is that which is felt about the wreſt.

The other marching by the *ulna* is with, its fellow, ſpread through the hand.

CAP. III.

Of the ſinewes of the Arme.

OUT of the perforations of the foure lower *vertebra* of the necke, and of the firſt two of the backe, ſixe ſinewes ſpring, which by the muſcle called *ſcalenus*, are carried under the cannel-bone to the arme-pit, where they are twiſted together; from theſe the four uppermoſt, accompanying the *baſilica* and the artery under the *deltoides* muſcle, are ſcattered through the inner ſide of the arme. The fifth and ſixth, turning up under the *rotundus major*, are inſerted into the hindermoſt muſcles of the ſhoulder-blade. Four remain, which paſſing along the arm are ſpred into the elbow and hand.

The firſt being carried under the inner ſide of the *biceps*, doth joyn it ſelfe with the *cephalica*.

The ſecond being undivided and

thicker, goeth down to the bending of the elbow, being covered with fat, and there is under the artery and the *baſilica*; but about the wriſt it is above the vein. About the wriſt it is divided into ten branches, imparting to every finger two ſprigs, which paſs along the ſides.

The third being entire alſo, is carried all along the elbow by the wriſt to the little finger: where divided into four twigs, it is beſtowed upon the outſide of the hand.

The fourth being thickeſt of all, is carried from the artery and veins by the backſide of the arm to the *radius*; where being joyned with the *Cephalica*, it endeth at the wriſt.

CAP. IV.

Of the veins of the Foot.

THE crural vein ſendeth a branch to *muſculus triceps*, called *Teſchia*, and is divided into four branches: of the which two are in the inſide of the thigh, and ſo many in the outſide. The one of the external is ſent to the fat of the thigh, the other paſſing according to the length of *muſculus ſuterius* to the ham; and from thence to the inner ankle, making the *ſaphena*. Of the inner branches the one lying high, is joyned with the crural artery, and paſſing through the outſide of the ham, is carried to the outer ankle: the other lying deeper, as it paſſeth, beſtoweth twigs to the adjacent parts, and about the ham, maketh the *poplitea*; from thence being carried between the focils by the chin of the inner ankle, it is beſtowed upon the ſoal of the foot, as the *ſaphena* was upon the outward parts. The veins hath valves within like to a half moon; without they are like knots; they are moſt commonly two together, one on each ſide, leaving ſome diſtance between, partly to ſtrengthen the coats of the veines, partly to rule the motion of the blood.

The arteries have no valves in their progreſſion, that the vital ſpirit may ſpeedily, as the beams of the Sunne, paſſe to the furthermoſt parts.

Cap. V.

Of the Arteries of the foot

A*Rteria cruralis*, or the crurall artery, a little below the groyne, doth ſend two branches through the muſcle *triceps* to the *gloutii*, or muſcles of the buttocks. Afterward it ſendeth two to the forepart of the thigh; then undivided, it paſſeth to the ham, where it is divided into two branches, whereof the one paſſeth by the ſide of the outward part of *tibia*, above the muſcle *peroneus*, and is beſtowed upon the upper part of the foot; the other entering into the *ſolæus*, and paſſing to the *pterna*, is diſperſed through the ſoal of the foot, The *ſaphena* is not accompanied with an artery, and the nerve is not very neer unto it, ſo that it may be ſafely opened.

CAP. VI.

Of the nerves of the Foot.

FRom the three lowermoſt *vertebræ* of the loynes, two ſinewes ſpring in the forepart of the thigh, ſevered firſt, and then being united, paſſe to the groyne. There it is divided into five branches, compaſſed with a membrane, which diſperſing themſelves on every ſide into the muſcles of the forepart of the thigh, even to the *rotula*, there being, cannot be diſcerned, unleſſe the muſcle *pſoa* be rent; within the which they lye hid. Then beſides theſe, you ſhall ſee another ſmall nerve paſſing the ovall cavity of *os pubis*, to be ſpent upon the *triceps*. Through the back-part back-part of the thigh, a great and thick nerve paſſeth framed of three, which ſpring out of the three upper holes of *os ſacrum*, and being carried by the ſinews of *os iſthium*, through the inner and back muſcles of the thigh, to the ham, there it is parted into two branches.

The one goeth down by the belly of the *tibia* unto the *pterna*, beſtowing twigs as it goeth, paſſing by the chin of the inner ankle to the ſoal of the foot, it is ſevered into as many branches as there are toes. The other branch marching upon the *perone*, is carried to the inſtep of the foot by the outer ankle. By reaſon of this great nerve, they who are troubled with the *ſciatica*, finde pain not onely about the joynt of the thigh, but in the leg alſo, and foot. About the beginning of this nerve, another iſſueth out of the third hole of the *os ſacrum*, and being carried above the ridge of the *os ſacrum*, it brancheth it ſelf into the muſcles of the buttocks, and thoſe which bend the *tibia*.

CAP. VII.

Of the Nerves of the ſpinalis medulla.

IF you invert the brain, you ſhall perceive four roots of the *ſpinalis medulla*, two from *cerebrum*, and ſo many from *cerebellum*: theſe joyned together make it up. It is of the like ſubſtance with the brain; but beſides the two membranes, wherewith the *cerebrum* is compaſſed, this hath a third ſtrong, and nervous proceeding either from *os occipitis*, where it is joyned with the ſpondils, or from the ligaments of the *vertebræ*: this ſtrengtheneth the *ſpinalis medulla*, and keepeth it from tearing in violent motions. From the beginning to the end it groweth narrower and harder, ſo that when it is come to the end of *dorſum*, it endeth in ſmall threds like a horſe tail, that no danger ſhould be in that part where the whole *ſpina* is bended.

The nerves of the *ſpinalis medulla*, are framed of ſundry filaments twiſted together, and covered with a thin membrane; and as they come out of the holes of the back-bone, nature doth compaſs them with a thick and firm ſubſtance; which ſo firmly clip the *fibres* of the ſinews that they cannot be ſevered. Beſides the ſinew commeth not out of that hole, directly oppoſite to its beginning, but out of the lower.

And when it hath paſſed through this hole, it doth not enter preſently into the rib, which is next, but into the lower. Which when it hath touched, being divided, it turneth the leſſer twig towards the *ſpina*, and the greater towards the fore-part. Out of this *ſpinalis medulla* twenty eight pairs of ſinews ſpring, ſeven from the neck, twelve from the back, and five from the loines, and four from the *os ſacrum.*

The firſt conjugation of the neck, doth not ſpring from the ſides of the *ſpina*, as the reſt; but from the fore and hinder-part, and commeth out between the *occiput* and the firſt *vertebra*. The fore-branch is beſtowed upon the muſcles of the back ſide of the head, and the muſcles of the *vertebra* of the neck.

The ſecond Conjugation, by the hindermoſt branch turned up, aſcendeth to the skin of the head, the ears, and the muſcles; but by the foremoſt branch it is carried unto thoſe muſcles, which are common to the ſecond ſpondil, and the *occiput*.

The third Conjugation ſendeth its foremoſt branch to thoſe muſcles which bend the neck: but the hindermoſt to the muſcles which raiſe up the neck and head.

The fourth Conjugation ſendeth its leſſer and hindermoſt branch to the muſcles of the neck; but the foremoſt and largeſt to the muſcles which lift up the ſhoulder-blade and the arm.

The fifth Conjugation with its leſſer twig turneth to the hindermoſt muſcles of the neck; and with the greater joyneth it ſelf with the twigs of the fourth pair.

The ſixth pair by the leſſer and hindermoſt branch paſſeth to the hindermoſt muſcles: but with the foremoſt and biggeſt to the arm and the *diaphragma*.

The ſeventh with the greater branch paſſeth to the arm, but with the leſſer to the hindermoſt muſcles.

As for the nerves of the back, each of them hath two branches, one leſſer, which is ſent to the muſcles of the back; and one greater, which is beſtowed upon the intercoſtal muſcles.

One thing is to be noted, that the ſinews which proceed from the *vertebræ* of the ſhort ribs are bigger then thoſe which are communicate to the upper intercoſtal muſcles. Thoſe about the middle of the rib are divided into two twigs; whereof the uttermoſt is carried outward, but the innermoſt inwardly along the rib. Theſe nervs were to be biggeſt, becauſe they are diſtributed both to the muſcles of the belly, and to the partscontained in it.

As for the nerves of the loynes, each paire of theſe hath anterior and poſterior branches, which are ſpent partly upon the muſcles of the loynes, and *hypogaſtrium*; partly upon the legs. The *lumbares nervi*, or ſinewes of the loines, meet, and are mingled with the *coſtales*. Whereby it commeth to paſſe, that the parts which are contained within the *peritonæum*, have their ſtrength from the *ſpinalis medulla*, as their ſenſe from the braine: for according to *Galen*, *cap*. 5. *lib*. 16. *de uſ. part*. the coſtal nerve is a ſprig of the ſixth conjugation.

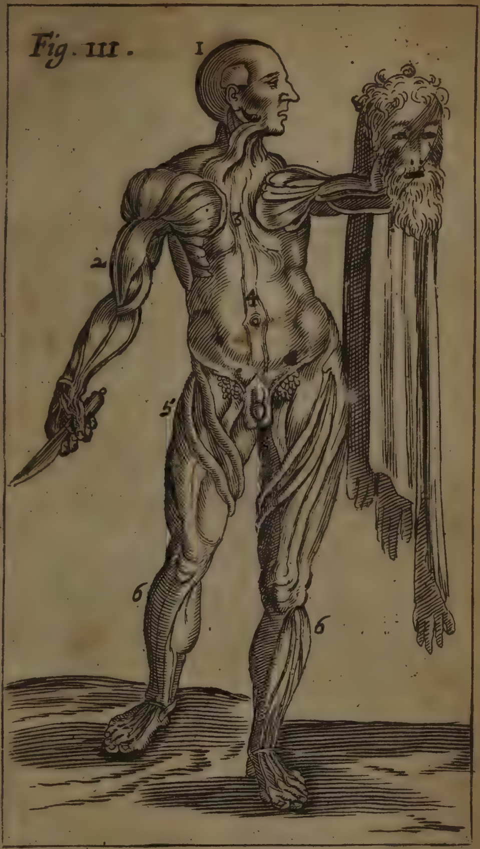
As for the nerves of *os ſacrum* the firſt paire hath two branches, as thoſe of the loynes; to wit, the anterior and poſterior; but the reſt of the paires before they come out, are double on each ſide: and on each ſide one nerve marcheth forward and another backward. The uppermoſt three, which are anterior, go to the leg: The two lowermoſt paſſe to the muſcles of the *anus* and bladder.

The explication of the Third Figure.

1. *The muſculous skin of the Head.* 2. *The muſcles of the Arm.* 3. *The muſcles of the Breſt.* 4. *The muſcles of the Belly.* 5. *The muſcles of the thigh.* 6. *The muſcles of the Legs.*

This Figure is to be placed before the firſt Chapter of the Treatiſe of the Muſcles.

Fig. III.



THE FIFTH BOOKE.

Containing

A Treatiſe of all the Muſcles of the Body.

CHAP. I.

The deſcription of a Muſcle.

The deſcription of a muſcle.

A Muſcle is a diſſimilary part, framed of its proper membrane, a fibrous fleſh, a tendon, veins, arteries, and nerves, appointed by nature to be the inſtrument of free motion. The parts then are either common, or proper. The common are three: The vein, the artery, and the nerve,

The parts conſtitutive.

nerve. The proper ſo many; the fibrous fleſh, the membrane, and the tendon. The veins afford nouriſhment, the arteries life, and the nerves motion. Theſe ſpring either from the brain, or from the *ſpinalis medulla*. It is implanted either in the beginning, or about the middle of the muſcle. The nerve as ſoon as it hath entred into the ſubſtance of the muſcles, like unto a ſhrub, it is diſperſed into a number of twigs, which at the laſt end in it, and become inconſpicuous. The fibrous fleſh is extended onely according to the ſtraight poſition of the *fibræ*, whereas the fleſh of the other parts hath no certain poſition. The fibres of every muſcle are always ſtraight: wherefore the muſcles of the belly have not their denomination from their fibres, for they are all ſtraight; but from poſition and ſituation: ſo that the muſcle called *maſſeter* is accounted double, ſeeing it hath two ſorts of fibres, one lying upon another. Every muſcle

Veins.
Arteries.
Nerves.

The fleſh

The fibres.

The fibres ſpring from the Nerves according to *Galen*.

muſcle hath a proper membrane ; It is ſo , more properly named then a coat : for veins and arteries are properly ſaid to have coats. The membrane doth either ſpring from the tendon,or is framed by nature in the very firſt conformation of the parts. The laſt proper part of the muſcle is the tendon. It is a ſimilary body, framed of the ſeed of a ſinewy-like ſubſtance,onely (for it hath a peculiar ſubſtance differing from a ſinew) white with a kinde of brightneſs, thick, hard, and ſmooth, extended according to the length of the muſcle. It is ten times bigger then a nerve : It beginning at the head of the muſcle, paſſeth through the belly of it, and endeth in the tail, as manifeſtly appeareth in the foot of a Cock. All muſcles which are appointed for the moving of bones, have tendons ; but thoſe which move other parts, as the tongue, lips, bladder, and the *anus*, ſeldom have. It is ſaid to ſpring from the bone ; this is to be underſtood by

The Membrane.

The tendon.

Which muſcles have tendons.

How it ſprings from the bone.

reaſon of its inſertion, but not production. It is the principal part of the muſcle,and not the fibrous fleſh: firſt becauſe it onely hath ſtrength to lift up the bones: ſecondly, becauſe it onely is fit to contract it ſelf, whereas the looſe and ſoft fleſh is neither able to lift up the bones, nor to contract it ſelf. Thirdly, becauſe there is not ſuch a part in all the reſt of the body. It hath its motory faculty from the nerve by influence, as the load-ſtone draweth the iron, and the cramp-fiſh doth benumme the hand of the fiſherman by the pole. It is framed by nature of the ſeed in the firſt conformation, and not of the nerve and ligament mingled together: Firſt, becauſe a nerve being ſomewhat ſoft, will not admit commixtion with the ligaments, being hard. Secondly, becauſe the nerve is not carried to the tendon, but doth end into inconſpicuous threds. Thirdly, Ligaments are inſenſible, but tendons are of exquiſite ſenſe; as appear-

It is the principal part of a muſcle.

From whence it hath its motive faculty.

Its material cauſe.

appeareth by the great pain which enſueth if they be pricked. Fourthly, becauſe the ligaments of the bones have the compoſition of membranes: for they are made of ſtraight and tranſvers fibres, as a web; whereas the tendons have only ſtraight fibres.

Its beginning.

The tendon beginneth at the belly of the muſcle, for there it is bigger & ſtronger than in the head or taile.

The figure of tendons.

The tendons are ſometimes round, as in the *muſculus biceps*; ſometimes membranous, as in the muſcles of the belly. Theſe are the parts conſtitutive of a muſcle. It hath beſides theſe, parts derived from the poſition; and thoſe are three:

The parts from the poſition.

The head, the belly, and the taile. The head is the beginning, this is in the part unto the which the muſcle is contracted: the belly is the thickeſt part, the taile is the ending of it, and it is inſerted into the part which is moved. It is called ἀπονεύρωσις, and commonly *Tendo*. The ſubſtance of the tendon in all theſe parts is uniforme.

The uſe of a muſcle.

The uſe of a muſcle was ſet down in the laſt part of the deſcription, in that it was ſaid to be the inſtrument of free motion, and not voluntary, becauſe beaſts have muſcles, unto whom will is denyed, becauſe it preſuppoſeth reaſon. A muſcle in motion preformeth that which a leaver doth, when as ſuch a heavy weight is to be lifted up, which cannot be done with the hands only. Seeing in every organicall part there are foure kinds of parts (according to *Galen*, 1. *de uſ. part*. c. 8.) The tendon is the principall part, which is ſometimes altogether united, ſometimes divided. The nerve is that part without the which the motion cannot be performed. The fleſh bettereth the action. The reſt of the parts help and further it.

The divers parts of a muſcle.

CAP.

CAP. II.

Of the differences and action of Muſcles.

From whence the differences of muſcles are taken.

THE differences of muſcles are taken from ſundry things: Firſt, from their ſubſtance: ſo ſome are fleſhy, as ſundry of the tongue and *larynx*: ſome are membranous, as the *conſtrictores* of the noſe: and ſome are partly fleſhy, and partly nervous, as the temporal. Secondly, from the quantity. The greateſt of all is the firſt of thoſe which extend the breſt; for it doth aſcend from the end of *os ſacrum* to the firſt *vertebra* of the *thorax*. The leaſt of all is the internal muſcle of the ear; the reſt are of a mean bigneſs, and come neer either to the biggeſt or the leaſt. From the quantity, the muſcles, are called either long, broad, or thick. Thirdly, from the ſituation: from hence ſome are called external, ſome internal, ſome ob-

The greateſt and ſmalleſt muſcle.

oblique, ſome ſtraight, ſome tranſverſe. Fourthly, from the figure: as *deltoides*. Fifthly, from their beginning: ſo ſome proceed from bones, ſome from cartilages, as thoſe of the *larynx*; ſome from tendons, as the *lumbricales*. Sixthly, from the variety of parts; ſo ſome are called *bicipites*, having two heads. Seventhly, from their compoſition; ſo ſome are ſingle, ſome double; becauſe ſome have more heads, ſome more tailes. The unity of the membrane and belly, which wrappeth the muſcle, cauſeth the unity of it; and the plurality of the membranes and bellies, the plurality of the muſcles. Eightly, from their action: Foure differences of muſcles are taken from hence: for firſt, ſome are hence called *fraterni*, or *congeneres*, brotherly; ſome *antagoniſtæ*, adverſaries. Secondly, ſome onely move themſelves, as the ſphinters; ſome other parts, as the reſt. Thirdly, ſome have one onely action, as the greateſt part of the muſcles; ſome

The cauſes of the unity and plurality of muſcles.

ſome have divers actions , as the *maſſeter* and *trapeſius*. The fourth difference is taken from the variety of the action; ſo ſome are called *flexores*, ſome *extenſores*, ſome *rotatores*, ſome *ſupinatores*.

The proper action of a muſcle.

As for the proper action of the muſcle, it is nothing elſe but the contraction of it towards its beginning. Now two things enſue after this contraction; for firſt, the part into which the muſcle is inſerted, muſt be apt to move: ſecondly, it muſt be drawn towards the beginning of the muſcle. The diverſity of the action proceedeth from the diverſity of the ſituation of the muſcles: ſo a ſtraight muſcle hath a ſtraight motion; a tranſvers, a tranſvers motion; an oblique, an oblique motion; and that which compaſſeth a part, hath an orbicular motion, as the ſpinters. Now of the motion of the muſcles there are foure differences; firſt, the contraction: ſecoudly, the perſeverance of the contraction: thirdly the

The cauſe of diverſity of the action.

The differences of the motion of muſcles.

the relaxation of the contraction: and fourthly, the perſeverance of the relaxation. this perſeverance is called *motus tonicus*, when as the member is ſtill kept in the ſame poſture; which is performed by that faculty which governeth the body. The efficient cauſe then of the action is the ſoul, moved by its appetite. It uſeth three inſtruments, the brain, the nerve, the muſcle: the brain receiveth the charge, the nerve carrieth it to the muſcle, and the muſcle doth perform the action; ſo that a muſcle from the action may thus be deſcribed; a muſcle is an organical part of the body, appointed for the free contraction of it ſelf towards its beginning, for the moving of the part into the which it is inſerted.

Motus tonicus.

The efficient cauſe of the motion.

A deſcription of a muſcle from its action.

CAP.

CAP. III.

Of the muſcles of the Eye-lids

EAch eye lid hath foure muſcles: the firſt is *frontalis*, to lift it up; the ſecond is *orbicularis major*, or the larger round muſcle under the frontall: the other two are called *Ciliares*, or of the eyelids: In each of them there is one to ſhut the eye-lids. The motion of the upper is manifeſt, but of the lower obſcure. In breadth they exceed not the breadth of the cartilage. To ſhew the frontall you muſt divide the skin of the forehead where the haire beginneth, untill you come to the eye-brow. *Orbicularis major* lieth under the frontall, and appeareth when the skin of the eye-brow is removed. The *Ciliares* compaſſe the eye-lids orbicularly.

The occipitall, or nowle-muſcles, meet with the frontalls, or thoſe of the for-head, in the upper part. The occipitalls begin on each ſide of the nowle, and marching upwards by a broad and membranous tendon to the eares, meet with the frontalls. If theſe be very fleſhy, they are able to draw back the whole skin of the head.

CAP. IV.

Of the muſcles of the Eye.

The ſtraight muſcles.

THeſe are in number ſixe; foure ſtraight, and two oblique. The firſt of the ſtraight is called *attollens*, or *ſuperbus*; that which pulleth up the eye. The ſecond is *deprimens*, or *humilis*, that which draweth downe the eye. the third is *adducens*, or *bibitorius*, that which pulleth the eye to the noſe. The fourth is called *abducens*, or *indignatorius*, that which pulleth it from the noſe.

The beginning, and inſertion of them.

All theſe ſpring from the cavity of the bone, making the orbit of the eye about the hole of the optick nerve; and being compaſſed with much fat, paſſing under the *conjunctiva*, end by a broad, but thin *aponeuroſis*, in the *cornea*, or horny membrane, where it beginneth to be cleer.

The oblique muſcles.

The oblique muſcles are called *circumagentes*, winders about, and *amatorii*, or love-makers, and are in number two; the firſt is *obliquus major*, *ſeu ſuperior*, the uppermoſt and largeſt. This beginneth within the orbit of the eye, by the hole of the optick nerve, and paſſing to the upper part of the great corner of the eye, endeth in a ſmall tendon, which paſſeth through a tranſvers cartilage there placed, as a cord through a pully, and is inſerted into the upper ſide of the *cornea*. The ſecond is *obliquus minor*, or inferior, the lowermoſt and ſmalleſt. This ſpringeth from the lower, and almoſt outer part of the orbit, about the chink, which doth unite the bones of the upper jaw-bone, neer to the glandule, and paſſeth obliquely to the outer corner of the eye, and in the upper meeteth with the tendon of the other oblique muſcle. This bringeth the apple of the eye to the noſe, as as the other draweth it from it.

How theſe muſcles are to be ſhewed.

Before you ſhew the muſcles of of the eye, cut off the fat with the ciſſars; then ſhew firſt the *obliquus major*, then the *obliquus minor*, and laſt of all the four ſtrait muſcles. Nevertheleſs, let the *obliquus major* remain laſt; when all the reſt are taken away, that you may ſhew the tendon of it paſſeth through the pulley the more plainly.

CAP. V.

Of the muſcles of the Noſe.

The raiſing up muſcles.

THE noſe hath ſix muſcles, whereof there be *erectores*, or raiſers upwards, two; one on each ſide of the noſe. They begin where the hole is under the glandule; and ſo cleaving to the bone, are outwardly inſerted and carried to the *Pinnæ*, or ſides of the noſe.

The ſtretching muſcles.

There are two alſo called *dilatatores*, or openers on each ſide one, which dilate the noſtrils, not raiſing up the noſe. They are like to a leafe of the myrtle tree. They have their beginning from the bone of the upper jaw, neer to the ſides of the noſe, and being placed about the cartilage, end in the top of noſe, called *pirula*, the tip.

The pullers together.

There be alſo two *conſtrictores*, pullers together of the noſtrils. Theſe are ſmall and membranous, hid under the membrane which covereth the inſide of the noſe. They have their beginning where the bone of the noſe endeth, and are implanted in the inner ſide.

CAP. VI.

Of the muſcles of the lips.

The common muſcles. THE muſcles of the lips are either common to the cheeks and lips, or proper onely to the lips. The common are two; the firſt is
1. *zygomaticus*, or *detrahens quadratus*: this is a thin muſcle, reſembling a membrane, enterlaced with fleſhy fibres. This hath its beginning from the *vertebræ* of the neck in the outer ſide, the ſhoulder-blade, the cannel bone, and the breſt-bone, and mouuting up by oblique fibres to the face, is implanted in the chin, where the two lips are joyned: this muſcle doth draw the cheeks downward. The
2. ſecond is called *buccinator*, or *bucco*; this lieth under the former, in the upper part of it. It doth make up all that part of the cheek which is blowne up when a trumpet is ſounded. This ſpringing from the brimmes of the upper jaw-bone circu-

circularly, doth end in the brims of the lower jaw-bone. It is wholly membranous, and interlaced with divers *fibres*, and is ſo covered with the membrane which covereth inwardly the mouth, that it hardly can be ſevered from it. When this muſcle is contracted, it is turned inwards, and ſo it turneth in the meat which hath eſcaped the teeth; and ſo when the meat is chewed, it is kept inwardly by the tongue, and outwardly by this muſcle, that it eſcape not from the teeth.

The proper muſcles.

Now the muſcles proper to the lips, are four pair: Firſt, *par attollens*, which beareth up the upper lips. 1. This ſpringeth from the firſt bone of the upper-jaw: where the apple of the cheek is, there it is broad and fleſhy: from thence marching obliquely to the fore-part, it is inſerted into both the ſides of the lips neer to the noſe. The ſecond is *deprimens*, which 2. pulleth down the lower lip. It ſpringeth from the ſides of the chin, where two ſmall bunchings are: there it is fleſhy; from thence marching obliquely, it is inſerted into the middle of the lip: it is everywhere broad. 3. The third pair is *abducens*, or drawing the lips to the ſides. It ariſeth fleſhy and round from the hollowneſs which is under the *maxilla*, and being lapped with much fat, it is inſerted into thoſe places, where both the lips are joyned together. 4. The fourth is *corrugans*, or *conſtringens*, that pair which purſeth the lips together. It is called alſo *oſculatorium*, or the kiſſing pair, which draweth the lips together when we kiſs. This pair is framed of a fungous fleſhy ſubſtance, having orbicular fibres, as the *ſpincter* hath. The ends of both the lips are made up of theſe, which appear red if we be in health, but pale if we be ſickly.

Cap. VII.

Of the muſcles of the lower jaw.

THE lower jaw is moved upwards, downwards, towards the right ſide, towards the left ſide, and towards the back-part. To procure theſe motions five pairs of muſcles are appointed: The firſt is called the *temporale*. This doth ſpring from all the the hollowneſs of the bones of the Temples, by a broad fleſhy, and ſemicircular beginning, and by degrees becomming narrower; and being carried under the yoke-bone, it is inſerted into the progreſs of the lower jaw-bone by a ſtrong tendon. This tendon is diſperſed through the whole muſcle. The *fibræ* paſs from the centre to the circumference. This muſcle is covered in its upper part with the *pericranium*; but in the lower part it is bare, and reſted upon the bare *cranium*. Wherefore if this muſcle be 1.

Why the wounds of the temporal muſcle are dangerous.

be wounded, fearful ſymptomes enſue, partly becauſe the tendon paſſeth through the whole muſcle: partly becauſe it is covered with the *pericranium*. This muſcle forcibly pulleth up the lower-jaw, and ſo ſhutteth the mouth, and ſpringeth from *os frontis*, *os ſyncipitis*, *temporum*, and the *ſphænoides*. The ſecond pair is called *deprimens digaſtricum*, or *biventre*, becauſe it hath two bellys, between which a tendon lieth: this doth pull down the jaw, and ſo openeth the mouth; It hath its beginning from the proceſſes of the veins of the temple, called *Styloidei*, where it is nervous and broad; and afterward becoming fleſhy, ſmall, and round, it paſſeth downward, and is inſerted into the inner fore-part of the jaw-bone, which is under the chin, and ſomewhat rough. The third is called *maſſeter*, becauſe it ſerveth for chewing by moving the jaw to the right and the left ſide: from its ſituation it may be called *laterale*.

laterale. This hath two beginnings: one is nervous ſpringing from the ſuture where the firſt bone of the jaw is joyned to the fourth. This beginning is large, and ſtrong: the other beginning is fleſhy, proceeding from the *os jugulare*, and ſo marcheth towards the chin, and is implanted into the whole largeneſſe of the lower jaw ſtrongly. The fibres of this muſcle, by reaſon of the two beginnings croſſe one another; ſo that theſe muſcles doe not onely move the jaw laterally, but backward and forwards alſo.

Its beginning. 1. 2.

4. The fourth paire is called *pterigoideum externum, aliforme externum.* or *pterigoideum abducens.* This being in its beginning ſtrong and partly nervous, and partly fleſhy, doth ſpring partly from the upper externall ſides of the wing-like proceſſes, partly from the rough and ſharp line of *os cuneiforme*: then marching by ſtraight fibres, it becommeth greater. It is inſerted by a ſtrong

tendon into the internall laterall part of the jaw, which is under the tendon of the temporall muſcle. This moveth the jaw forward, which appeareth when the lower teeth are placed above the upper. The fifth paire is termed *maxillam adducens*, or *pterigoideum internum*. This draweth the jaw towards the head, or backward. This, in the beginning being thicke and nervous, doth ſpring from the inner cavity of the wing-like proceſſes; then becommeth fleſhy, large, and thick; marching by a ſtraight paſſage, it is inſerted into the lower jaw by a nervous, broad, and ſtrong tendon, in the inner and hinder part of the jaw, about the cavity where the nerve entreth, where ſome aſperities are found. 5.

CAP.

upward and downward. It hath foure proper muſcles. The firſt is called *trapezius* or *cucullaris*: this hath its beginning from the lower part of the nowle-bone towards the eare, fleſhy: but from the *poſterior* proceſſes of the *vertebræ* of the necke, and the eight upper *vertebræ* of the breſt, it ſpringeth membranous and broad, and is inſerted into the *baſis* of the *ſcapula*. The ſecond is *levator*, or *patientia muſculus*: this hath its beginning from the tranſverſe proceſſes of the firſt, ſecond, third, and fourth *vertebræ* of the necke, which beginnings being united, are inſerted into the upper corner of the ſhoulder-blade. The third is *ſerratus minor anticus*: this ſpringeth from the foure upper ribs before they become cartilaginous: cleaving to theſe be foure fleſhy portions repreſenting the teeth of a ſaw, and are inſerted by a broad tendon neer to the anchor-like proceſſe of the *ſcapula*. The fourth is *rhomboides*; this is placed immediately 1 2 3 4 under the *cucullaris*. This ſpringeth fleſhy from the hinder proceſſes, or *ſpinæ* of three of the *vertebræ* of the neck, and ſo many of the breſt; and is inſerted by as broad a fleſhy ending, as the beginning was into the *baſis* of the ſhoulder-blade. The fifth is *ſerratus major*: 5 this hath its beginning from the eight upper ribs before they become griſtly. The beginnings are fleſhy portions like to the teeth of a ſaw, by which it is inſerted into the like portions of the oblique deſcending muſcle. Then it marcheth fleſhy, by the ribs upwards at the ſides of the breſt, and is implanted by a large fleſhy end into the whole inner *baſis* of the *ſcapula*. It moveth the ſhoulder-blade forward and downward. The beginning muſt be in the breſt where the fleſhy portions are; becauſe there the nerves are inſerted: and that part is ſteady, which the *ſcapula* is not.

CAP.

CAP. XXI.

Of the Muſcles of the Arme.

THE arme hath five motions, for it moveth backward, forward, upward, downward, and circularly. It is moved upward by two erectors, *deltoides* and *ſupraſpinatus*. Firſt, *deltoides ſpringeth* from the middle of the cannel-bone, the top of the ſhoulder, and the whole *ſpina* of the *ſcapula*, and is inſerted into the middle of the ſhoulder-bone. 1. The ſecond is *ſupraſpinatus*, or *ſuperſcapularis ſuperior*: this placed in the cavity above the *ſpina* of the ſhoulder-blade, and paſſing under the upper part of the *ſcapula*, is inſerted into the necke of the ſhoulder-bone, which it compaſſeth with a broad tendon. 2. It is pulled downe by *latiſſimus*, and *rotundus major*. Depreſſors. *Latiſſimus*, ſo called from its largeneſſe; for with its mate it covereth the whole backe. 1. It is called *ani ſcalptor*, or *terſor* ; for without theſe this office could not be performed. This ſprings by a broad membranous beginning from the hinder proceſſes of the *vertebræ* of the breſt, beginning at the ſixth, and reaching to the middle of the *os ſacrum*, and upper part of the *os ilium*: then paſſing upwards, when it is come to that part of the backe where the ribs bend, it becommeth fleſhy, and paſſeth by the lower corner of the *ſcapula*: where becomming narrow, it is inſerted under the upper end of the ſhoulder-bone by a ſhort broad tendon betweene the *muſculus pectoralis*, and the *rotundus detrahens*. *Rotundus major*, or more properly, *teres major*, becauſe it is long without edges, this ſpringeth from the whole *coſta* of the *ſcapula*, and is inſerted into the ſhoulder-bone, a little below the necke of it.

Movers forward. 1 It is drawne forward by *pectoralis* and *coracoideus*. *Pectoralis*, it beginneth from the ſeventh, ſixth, and fifth true ribbes, the *ſternum*, and above the halfe of the cannell-bone, and by a ſharpe tendon it is inſerted into the ſhoulder-bone, between the *deltöides* and the *biceps*. *Coracoides*, it beginneth at the *coracoides apophyſis*, and endeth about the middle of the ſhoulderbone. 2.

Pullers backward.

It is moved backward by three: *infraſpinatus*, or *ſubſcapularis*, or *immerſus*, and *rotundus minor*: *infraſpinatus*, or *ſubſcapularis*, it poſſeſſeth the whole cavity of the *ſcapula*. It ſpringeth from the *baſis* of it, fleſhy, and ſo continuing, paſſeth forward; but becomming ſtill narrower to the necke of the *ſcapula*, at the laſt it getteth a broad tendon by the which it is inſerted into one of the ligaments of the arme. *Rotundus minor*, or *ſuperſcapularis inferior*: this ariſing from the *baſis* of the *ſcapula* by a fleſhy beginning, marcheth forward; and becomming narrower is inſerted into the fourth ligament of the arme, by a broad and ſhort tendon.

Nota. One thing is to be noted, that the tendon of *muſculus latiſſimus* together with the tendon of *muſculus temporalis*, cauſe that cavity which is ſeene in the cavity of the arme-pit; for the tendon of the *latiſſimus* frameth the inſide, but that of the *temporalis* the outſide of the cavity.

CAP. XXII.

Of the Muſcles of the Ulna.

THE elbow hath two bones, *ulna* and *radius*. The *ulna* ſerveth for flexion, and extenſion; but the *radius* for pronation and ſupination. The *ulna* is bended by two, to wit, *biceps*, and *brachiæus internus*. *Biceps* hath two beginnings from the ſhoulder-blade. The firſt is that which is outward, tendinous and round; it ſpringeth from the upper brim of the hollowneſſe of the *ſcapula*, and marcheth under the ligaments of the joynt,

Benders of *ulna*.
1

joynt, above the top of the ſhoulder by the chink in the bone made for that purpoſe, where it is wrapped by a ligament which riſeth from the hollowneſſe. The ſecond head is broader than the firſt, framed partly of a tendon, and partly of fleſh; it ſprings from the anchorlike proceſſe of the ſhoulderblade; then deſcending by the inner part of the top of the *ſcapula*, it meeteth with the former; below the head of the ſhoulderbone, it becommeth a ſtrong fleſhy muſcle: afterward ending in a thick, round, and ſtrong tendon, it is inſerted into the long knob, under the upper end of the *radius*. This is that tendon which cauſeth great paine if it be pricked in phlebotomy. *Brachiæus internus* lying under the *biceps*, riſing from the middle of the ſhoulderbone, unto which it cleaveth firmly: it is inſerted both into the *ulna* and *radius*, where they meet.

The *ulna* is extended by foure muſcles, *longus*, *brevis*, *brachiæus* externus, Extenders

1 *externus*, and *cubitalis*. *Longus* ariſeth from the lower brim of the *ſcapula* neer to the neck, where it hath a peculiar hollowneſſe; and endeth in the knop of the el-
2 bow. *Brevis* riſing from the hinder part of the neck of the ſhoulder-bone, endeth in like manner in the *olecranum*; both theſe make
3 but one ſtrong tendon. *Brachiæus externus* placed under theſe two: it is placed upon the outſide of the ſhoulderbone: it is confounded with the other two, and endeth where they doe, but this ſeemeth to *Spigelius* (*de human. corp. fabrica lib.* 4 *c.* 15.) to be but a fleſhy portion, ariſing about the middle of the ſhoulder, and no peculiar
4 muſcle. *Cubitalis*, or *anconeus*: it is placed in the hinder part of the bending of the elbow, which is called ἀγκών, and anſwereth to the *muſculus poplitæus*: this ariſeth from the lower and hinder part of the ſhoulderbone; and placed betweene the *ulna* and the *radius*, it endeth by a nervous tendon in the

the laterall part of the elbow an inch below the *olecranum*. The extending muſcles have ſtraight fibres.

CAP. XXIII.

Of the Muſcles of the Radius.

The pronators.

THe *Radius* hath two ſorts of muſcles: for ſome are called *pronatores*, or pullers down: ſome *ſupinatores*, or raiſers up. The *pronatores* are two in number: the 1 firſt is, *pronator ſuperior rotundus*: this ſpringeth from the root of the inner knob of the ſhoulder-bone, and from the inner ſide of the *ulna*, where it is joyned to the arme-bone; and endeth obliquely about the middle of the *Radius* by a membranous tendon. The ſecond 2 is *pronatur inferior quadratus*: this is altogether fleſhy. This ſpringeth from the lower and inner part of the *ulna* two inches broad; then marching obliquely above the ligament which joyneth the *radius* to the *ulna*, it endeth in the inſide of the *radius*. The ending is as broad as the beginning; wherefore it is called *quadratus*, or foure ſquare.

Supinators The *ſupinatores* are in like manner two. 1. The firſt is *ſupinator longus*, ſo called, becauſe of all the muſcles which march by the *ulna*, it hath the longeſt belly. This ſpringeth fleſhy from the edge of the inner knob of the *ulna*; and marching obliquely under the *radius*, is implanted by a membranous tendon into the upper part of the lower *appendix* of the *radius*, bending ſomewhat to the innerſide. 2. The ſecond is *ſupinator brevis*: this ſpringeth from the outward part of the ligament of the lower end of the arme-bone, and from the hinder proceſſe of the *ulna*; being without membranous, and within fleſhy, it is inſerted into the middle of the *radius*.

CAP.

Cap. XXIV.

Of the Muſcles of the Wriſt.

Benders. 1 THE Wriſt is bended by two muſcles in the inſide. The firſt is *cubitæus internus* : this doth ariſe by a fleſhy and nervous beginning from the ſharp inner knob of the ſhoulderbone ; then paſſing fleſhy by the length of the *ulna*, it doth end by a tendon, partly nervous, and partly fleſhy, in the fourth bone of the firſt ranke in the Wriſt. 2 The ſecond is *brachiæus internus* : this ariſing from the ſame place, and paſſing a longſt the *radius*, is inſerted into that bone of the back of the hand which doth hold up the fore-finger.

Extenders 1 Two externall muſcles ſtretch out the *carpus*. The firſt is *radiæus externus*, *ſive bicornis* : this ariſeth from the ſharpe edge of the outer knob of the ſhoulderbone in the upper part of it, by a broad beginning : then becomming fleſhy, it paſſeth to the middle of the *radius*, where it becommeth a ſtrong tendon, which preſently is divided into two tendons more broad then thicke. Both theſe paſſe a little aſunder by the *radius* under the ligament, whereof one is inſerted into the bone which ſtayeth the firſt finger, and the other into the bone which ſtayeth the middle finger.

2 The ſecond is *cubitæus externus*: this hath its beginning from the root of the external knob of the ſhoulder-bone, in the upper end of it: when it is come to the wriſt, it becommeth a ſtrong round tendon, and is inſerted into the upper part of that bone which ſtayeth the little finger, not farre from the wriſt.

CAP. XXV.

Of the Muſcles of the Palme of the Hand.

THis is thought to have two muſcles. The firſt is *palmaris*;

this ariſeth from the inner knob of the ſhoulder bone round and nervous ; and placed under all the muſcles, it mounteth over the *ligamentum annulare*, Then it is dilated into a broad membrane, which cleaveth firmly to the skin of the palme of the hand, for firm apprehenſion, and quickneſſe in feeling, and endeth about the firſt joynts of the fingers, The ſecond is *caro quædam quadatra*, or a four-ſquare fleſhy ſubſtance : this ſpringeth from the *membrana carnoſa* under *mons lunæ*, where the eighth bone of the wriſt is placed. From thence it is carried under the *muſculus palmaris*, to the middle of the palme of the hand, and is inſerted into the outſide of that tendon which carrieth the little finger from the reſt. This repreſenteth two or three muſcles, and ſerveth for the hollowing of the palme of the hand, to forme *Diogenes* his cup by, bringing the fleſhy eminence under the little finger to the tenar.

Cap. XXVI.

Of the Muſcles of the four fingers,

THE fingers are bended, extended, and moved laterally. Now the muſcles which performe theſe motions, either belong to the other fingers, or to the thumb.

Benders of the four fingers.

The fingers are bended by two muſcles. 1 The firſt is *ſublimis:* this ſpringeth from the inſide of the inner knob of the ſhoulderbone; and about the wriſt it produceth foure tendons, which end about the ſecond joynts of the fingers. Theſe are hollow to give way by a chink to the tendons of the *profundus*. 2 The ſecond is *profundus:* this ariſeth from the upper parts of the *ulna* and *radius* under the joynt, and being ſeparate into four tendons, they are implanted into the third joynts of the fingers, under the *ligamentum annulare*, by the tendons of the *muſculus ſublimis*, under which they lye.

Extenders.

The toes are extended by three muſcles

whereof one is common, and two proper. The common is *extenſor magnus* : this ariſing from the outer knob of the arme-bone, about the wriſt, is divided into foure tendons, which end in the lowermoſt joynts of the fingers. The proper are two; the firſt is *indicator*, becauſe it belongeth to the fore-finger. It ariſeth from the outward and middle part of the *ulna*, and by a double tendon it endeth in the ſecond joynt of the fore-finger: but one of the tendons becommeth one with the tendon of the *extenſor magnus*. The ſecond is *auricularis*, becauſe it belongeth to the little finger. It ariſeth from the upper part of the *radius*, and marching between the *ulna* and the *radius*, it is inſerted outwardly by a double tendon into the little finger.

Movers lateralie.

The fingers are laterally moved two manner of waies : for either they are brought to the thumb, or they are carried from it. Theſe motions are performed by two

ſorts

Interoſſei.

ſorts of muſcles, called *interoſſei*, and *lumbricales*. The *interoſſei*, ſo called, becauſe they are placed betweene the bones of the *metacarpium*: they are fleſhy and round, and ſpring from the bones unto the which they are tyed: they paſſe ſtraight along it theſe bones: theſe when they are come to the roots of the fingers, they paſſe into tendons which cleave to the ſides of the fingers, and end in the ſecond joynt by their tendon. Six are placed betweene the three diſtances, between the bones of the *metacarpium*, ſo that there are two betweene each diſtance: whereof one doth paſſe to the lower, one to the upper part of the tendon. The middle and ring finger receive two tendons, but the fore and little finger but one. The *lumbricales* are in number foure: theſe ariſe in the diſtances of the tendons by the wriſt, and meet with the *interoſſei* about the firſt joynt of every finger. The firſt is inſerted into the ring finger; the ſecond & third to the middle finger; but the fourth to the fore-finger: theſe are not one with the tendons of the *interoſſei*.

Abducing muſcles, two:

Beſides theſe muſcles, the fore finger and the little finger have one *muſculus abducens*. That of the fore finger ſpringeth from the middle of the *ulna* : then neer the wriſt it is parted into two tendons which paſſe under the ligament. The upper is implanted at the root of the fore finger ; but the lower into the root of the middle finger. That of the little finger, called *hypothenar*, is placed in the palme of the hand under the little finger. It is ſhort and ſtrong ; it ſpringeth fleſhy from the fourth bone of the *metacarpium*, and is implanted by a ſmall nervous tendon into the outſide of the firſt bone of the little finger.

Cap. XXVII.

Of the Muſcles of the Thumb.

Extenders. 1

THe Thumb is extended by two muſcles. The firſt is that which is called *longior*: this ariſeth fleſhy from the outer and higher ſeat of the *ulna*, where the rough line is;and the membranous,which tieth together the *ulna* and *radius*: from thence it is carried obliquely to the *radius*, and before it come to the *appendix* of it, it becommeth a round tendon, which paſſing under the annular ligament, marcheth according to the length of that ſide, which is next to the forefinger, and is inſerted into the third bone of it. The ſecond is

2 *brevior*: this extendeth the ſecond and third joynt of the thumbe. It ariſeth from the ſame line fleſhy: it paſſeth obliquely above the *radius*. By one tendon it is implanted to the root of the firſt joynt of the thumb; by the other becomming membranous it cleaveth faſt to the ſecond and third bone of the thumbe.

Benders. 1 It is bended by one muſcle; which ſpringing from the inner part of the *ulna*, is implanted into the firſt and ſecond joynt of the thumbe. This being fleſhy, which *Spigelius de hum. corp. fabric. l. 4. c. 19.* divided into five muſcles, together with the *abducent* of the thumb, makes up *monticulus lunæ.*

Monticulus lunæ. Movers laterallie.

It is laterally moved by two muſcles. The firſt is called *thenar*, or *abducens*, this ſpringeth from the inner part of the bone of the wriſt which ſtayeth the thumbe, by a nervous beginning: then becomming fleſhy, it is inſerted into the firſt joynt of the thumbe by a membranous tendon: this draweth it from the fore-finger. The 2 ſecond is *antithenar*, or *adducens*: this is ſeated outwardly, in the diſtance betweene the thumb and fore finger. This doth ariſe from the outer and hinder ſide of that bone which ſtayeth the firſt finger; and being fleſhy is inſerted into the whole inner ſide of the firſt joynt of the thumb; this draweth the thumb to the fore finger.

CAP.

Cap. XXVIII.

Of the Muſcles of the Thigh.

Benders forward. THE Thigh is bended forwards by three muſcles. The
firſt is *pſoas*, or ψόα, and *lumbaris*:
that lieth in the inner part of the
abdomen, upon the *vertebræ* of the
loines. It ariſeth from the tranſverſe
proceſſes of the two lowermoſt
ſpondils of the backe, and
marching by the inſide of *os ilium*,
it is inſerted into the leſſer *rotator*.
2 The ſecond is *iliacus internus*: this
ſpringing from the inſide of *os
ilium*, and being joyned to the
pſoas by his tendon, it endeth
before betweene the greater and
3 leſſer *rotator*. The third is *pectineus*:
this ariſing from the upper part
of the *os pubis*, is implanted a
little below the necke of the thigh
bone.

Benders backward, It is bended backward by the
three *glutii*, which make up the
1. buttockes. The firſt is the outermoſt

moſt and the greateſt: it ſpringeth from the *coccyx*, from the edge of *os ſacrum*, and from the halfe of the bending of *os ilii*, and is inſerted foure inches below the great *rotator*. 2 The ſecond is the middlemoſt: this ſpringeth from the outer part of *os ilium*, and is inſerted into the outer ſide of the great *rotator*. 3 The third is the lowermoſt; this ſpringeth a little lower, from the outer part of *os ilii*; and is implanted into the upper part of the great *rotator*. It is drawne to the inſide by the *muſculus triceps*: this is the biggeſt of all the muſcles of the body, and hath three beginnings, which end in one muſculous tendon. The firſt head doth proceed from the upper part of the ſhare-bone, and lying by the *pectineus*, is inſerted into the middle of the thigh-bone. The ſecond ſpringing from the middle of the ſame bone, being leſſer, is inſerted a little below the necke of the thigh-bone. The third ariſing from the lower part of the ſame

Drawers to the inſide.

ſame bone, being of all the lowermoſt and biggeſt, reacheth to the end of the thigh-bone by a very ſtrong tendon. Theſe are inſerted into the hinder line which is in the bone. *Spigelius de hum. corp. fabric. l.* 4. *c.* 22. addeth another, 2 which he termeth *lividus* : this proceedeth from the fore-part of *os pubis*, where the cartilage is, which joyneth the two bones by a broad and fleſhy ſubſtance. As it deſcendeth obliquely it becommeth a large tendon, but ſhort : and marching downe by the inner part of the thigh, it is inſerted into the middle of the thigh-bone.

Turners toward the outſide.

It is turned towards the outſide by foure ſmall muſcles called *quadrigemini*. They are placed above the articulation of the thigh one by another. 1 The firſt is called by others *Iliacus externus*, and from the figure *pyriformis* ; it is longer than the reſt ; it ariſeth from the lower and outer part of the *os ſacrum*. 2 The ſecond ariſeth from

3 the knob of *os iſchii*. The third ariſeth from the ſame part. Theſe are inſerted into the hollowneſſe of the great *rorator*. 4 The fourth is called *quadrigeminus quadratus*, more fleſhy and broader than the reſt: it lyeth two inches diſtant from the third: it ariſeth from the inner part of the knob of the *iſchium*, and is implanted into the outward part of the great *rotator*. It is rowled oblique by two muſcles called *obturatores*.

Rowlers obliquely.

1 The firſt is *obturator internus*, this rowleth it outward: this ariſeth from the inner circumference of the *os pubis*, and is inſerted into the cavity of the great *rotator*. 2 The ſecond is *obturator externus*: this ariſeth from the externall circumference of the hole of the *os pubis*, and returning by the neck of the thigh-bone, as by a pully, it endeth in the cavity of the great *rotator*, under the fourth *quadrigeminus*.

Cap. XXIX.

Of the Muſcles of the Leg.

Benders. THE ſhanke hath thirteene Muſcles, whereof foure doe bend it. 1 The firſt is *ſeminervoſus*: this beginneth at the knop of the *iſchium*, and endeth in the inner ſide of the *tibia*, towards the back-ſide. 2 The ſecond is *ſemimembranoſus*: it proceedeth from the ſame knob, partly nervous, and partly membranous; but it marcheth by a broad tendon to the inner and hinder part of the *tibia*. 3 The third is *biceps*: this ariſeth from the ſame knob of the *iſchium*; and being carried by the outſide of the *tibia* in man, about the middle of the thigh, it becommeth fleſhy; and by one tendon it is inſerted into the outſide of the *tibia*. That this tendon may bee the more ſafely carried, the thigh-bone is griped and covered with a ſmooth and ſlippery ligament, the fourth is *poſticus gracilis*: this ariſeth from the line where the ſhare-bone and hip-bone are joyned together, and marching downe in the inner ſide of the thigh, it is inſerred into the inſide of the *tibia*. In fat perſons this ſeemeth to be a ſtiffe ſinew, when they ſtride much. The ſhanke is extended by five muſcles. The firſt is *membranoſus*: this proceeding from the upper part of the edge of the *iſchium*, doth compaſſe both the thigh and the leg; wherefore it is called *faſcia lata*, becauſe it covereth all the muſcles of the thigh and leg, reaching to the foot. If it be nipt by ſharpe humours, great paine is cauſed. The ſecond is *longus*: this ariſeth from the upper and fore-part of the edge of the bending of the *os ilium*, and paſſing by the inſide of the thigh obliquely, it endeth in the inſide of the leg: and becauſe it is thought to bring in the leg, that it may be layd upon the other, ſome call it *ſutorius*, the Shoo-makers muſcle: but it may be

Extenders
1

2

be more truly called *ſartorius*, the
Taylors muſcle; for when they
ſow upon their ſtals they ſit croſſe-
3 legged. The third is *rectus gracilis*;
this ſpringing from the lower
brim of the *os ilium*, and paſſing
ſtraight alongſt the length of the
thigh, endeth in the *patella* by a
4 broad tendon. The fourth is *vaſtus*
duplex: theſe are placed at the ſides
of the *graeilis*, whereof the one
is called *externus*; this ſpringeth
from the root of the greater *tro*-
chanter, it endeth a little below the
patella, outwardly. The other is
5 called *internus*; this ariſeth from
the root of the leſſer *trochanter*,
and endeth in the inſide of the leg,
6 a little below the *rotula*. The fifth
is *crureus*: this lieth under the
two *vaſti*; it ſpringeth from the
fore-part of the *os femoris*, be-
tween the two *trochanters*, it
endeth in the *rotula*. Theſe four
muſcles, the *rectus*, *gracilis*, the
two *vaſti*, and the *crureus*, meeting
about the knee, become one ſtrong
tendon, which covereth the *patella*.

One thing is to be noted, that the muſcles which extend the leg are ſtronger then thoſe which draw it in, that the weight of the body may be the better upholden when we ſtand. 7. To theſe we may adde that muſcle which is called *popliteus*, or *ſuppopliteus*, which moveth the leg obliquely: this lyeth in the hollow of the ham, above [illegible] head of the *ſolæus*: it ſpringeth from the outer knop of the thigh-bone, and is inſerted in the upper and hinder part of the leg, which it clippeth firmely.

Cap. XXX.

Of the muſcles of the Inſtep.

Benders, THE Inſtep is bended when it is drawne upwards. To performe this motion it hath two: 1 the firſt is *tibiæus anterior*: this ariſeth from the upper *epiphyſis* of the *tibia*, neere to the *fibula*, and cleaving unto the whole *os tibiæ*, about the middle of it, it becommeth a tendon, which paſſing under the annular ligament of the Inſtep, is divided in two tendons; whereof the one is inſerted into the firſt of thoſe bones which are called *innominata*, without a proper name: the other is inſerted into the bone ſet before the thumb. 2 The ſecond is *peronæus anterior*: this [illegible]ſeth from the outer and middle part of the ſmall focill, and being carried through the chinke of the outer ankle, it is inſerted into the bone of the Inſtep, which ſtayeth the little toe: it hath two heads and two tendons. The foot is extended when it is drawn backwards. To performe this motion it hath two muſcles. Extenders. 1 The firſt is *gemellus externus*, or *gaſtrocnemius externus*: this muſcle hath two heads, that have ſeedbones not far from their beginnings. The firſt head is under the ham, from the inner part of the end of the thighbone, where it is fleſhy and broad. It marching down by the back and inner part of the *tibia*, when it is come to the middle of it,it becommeth tendinous, and is joyned with the tendon of *gemellus internus*. The other head likewiſe ariſeth under the ham, but from the outer part of the end of the thigh-bone. It paſſing downe by the outward and back part of the Leg, becommeth tendinous a little above the tendon of the former; then being joyned to the former, they become one ſtrong, broad, and ſinewy tendon, which is inſerted into the heele. The ſecond is *gemellus internus*, or *gaſtrocnemius internus*: this lyeth under the former, and is of a livid colour. It ſpringeth from the *appendix* of the leſſer focil by a ſtrong nervous ſubſtance: it doth become thicker, but when it hath paſſed the middle of the *tibia* it becommeth narrower, and tendinous; and a little above the heele it is ſo united to the tendon of the former *gemellus*, that both ſeeme to be but one, and is inſerted into the heele. By this tendon Butchers hang up the

Movers obliquely. 1. beaſts killed. The Inſtep is moved obliquely by two. The firſt is *tibiæus poſticus adducens pedem or Nauticus*, becauſe Sailers uſe it much when they goe up by the ropes. It ſpringeth both from the greater and leſſer focill, and from the ligament which tyeth theſe together ; it being tyed to this tendon, lyeth amongſt the hinder muſcles, and neere to the inner ankle it becommeth tendinous: then paſſing by it, it goeth to the ſoale of the foot, and is inſerted into the lower part of the bone which is next to the *cubiforme*. 2 The ſecond is *peronæus vel fibulæus poſticus* : this ariſeth from the upper, but hinder part of the ſmall focill, by a nervous and ſtrong beginning ; and cleaving to the outſide of the perone, it paſſeth down round and fleſhy : the outer part is of a livid colour, but the inner of a red. When it is come to the middle of the focill it becometh tendenous, which behind under the outward ankle, obliquely marching, is inſerted under the ſoale of the foot into the bone ſet before the great toe. To theſe may be added the muſcle which is called *plantaris*, becauſe it covereth the whole ſoale of the foot. It lyeth under the *gemellus externus*, and ſpringing from the outer part of the end of the thigh bone, under the ham, by a round fleſhy beginning; then paſſing within the leg, between the two *gemelli*, and from thence to the ſoale of the foot, it covereth all the toes about the firſt joynt, and is inſerted into all the toes. It anſwers *palmaris*.

Plantaris muſculus.

CAP. XXXI.

Of the Muſcles of the Toes.

Extenders. 1

THE toes are extended by two. The firſt is *longus*; it doth ariſe by a nervous and ſharpe beginning from the fore *appendix* of the great focill, and cleaving to the ligament which uniteth the two focils, it goeth down to the foot. Firſt, it paſſeth nnder the tranſverſe ligament; then it being divided into four tendons, they are inſerted into the third and ſecond joynt of the four toes to extend them. The ſecond is *brevis*: 2 this lieth under the former: this hath its beginning from the tranſverſe ligament, fleſhy and broad, and by its four tendons it is inſerted into the firſt joynts of the four toes. Benders. The benders of the toes are in like manner two. 1 The firſt is *longus*, or *perforans*: it lieth under the *gemellus internus*, aud ariſeth from the hinder part of the *tibia*, under the ham by a long and a fleſhy beginning; and paſſing according to the length of the *tibia* unto the which it cleaveth, when it hath the middle of it, it becommeth tendinous: then under the inner ankle, and the ligament which reacheth from the lower *appendix* of the *tibia*, it goeth by a hollowneſſe of the heele to the ſoale of the foot; where being divided into four tendons, it paſſeth through the holes of the *flexor Brevis*, and is inſerted into the third and laſt joint of the foure fingers. The ſecond is *brevis*, or *perforatus* : this ſpringeth from the inner part of the heele-bone, and when it hath paſſed the middle of the foot, it is parted into foure round tendons which are inſerted into the ſecond joints of the foure toes, being perforate to give way to the tendons of the former muſcle to paſſe to the third joynt. Thirdly, *lumbricales*, foure: theſe ſpring from the tendons of the *perforans*, ſmall and round, and are inſerted by a ſmall tendon into the ſide of the firſt joynt, which they helpe to bend. The fleſhy ſubſtance, which filleth up the cavity of the firſt joynts of the foure fingers, ſeemeth much to further the action of theſe muſcles : for ſpringing by two ſharpe beginnings from the lower part of the heelebone, it is inſerted into the beginnings of the foure *lumbricales*. 2

Lumbricales.4.

The *interoſſei* are placed betweene the bones of the inſtep. Theſe *interoſſei*, ſo called, becauſe they are placed betweene the bones, in the foot, are ten in number; whereas there are but eigth in the hand, becauſe the inſtep hath one bone more then the wriſt. Each of them doth ſpring from the ſide of the bone of the inſtep where it is placed; and all marching according to the length of the bone fleſhy, they are inſerted into the roots of the fingers by ſhort tendons, and ſomewhat broad. If the inner be drawne together, the finger is brought in; but if the outer be moved, the finger is carried from the reſt. Betweene the foure diſtances between the bones, there are eight ſuch muſcles; at the outſide of the thumb one, and one other at the outſide of the little finger. Beſides theſe you may obſerve a ſmall tranverſe muſcle, which paſſeth from the thumbe over the firſt joynts of the fingers to the little finger. It ſeemeth to have

The tranſverſe muſcle. The invention of this is aſcribed to *Caſſerius* by *Bartolinus* l.4.c. 14.

have a twofold uſe: firſt, to tye together the bones of the firſt joynts of the toes. Secondly,to ſave their tendons from harm when we tread upon hard things.

Extenders of the great toe.

The great toe hath peculiar
muſcles. The firſt is *extenſor*: this
ſpringeth by a fleſhy beginning 1
from the outſide of the great focill,
where it parteth from the
fibula. It cleaveth faſt to the ligament,
which ties the *tibia* to the
fibula, and marching alongſt the
upper part of the foot,it is inſerted
into the whole upper part of the
thumb. The ſecond is *flexor:* this 2
ſpringeth from the backe part of
the *fibula*, about the middle of it
fleſhy and pointed: then becomming
thicker, about the inner
ankle it becommeth tendinous and
is inſerted into the laſt joynt of the
thumb:before it come to the ſecond
joynt it hath a larger ſeed-like bone
then the joynts of the reſt of the
fingers have. The third is *adducens* 3
pollicem, which draweth the great
toe from the reſt, to the inner part

of the foot. It ſpringeth nervous from the ligament which tyeth together the heele-bone, and the *talus*, it cleaveth to the bone ſet before the thumb, and is inſerted by a round tendon into the outſide of the firſt joynt of the great toe.

4 The laſt is *abductor minimi digiti*: this being placed in the outſide of the foot it proceedeth from the outer part of the heele-bone, where the knob is nervous; but becomming fleſhy, and being tyed to the bone of the *metatarſus*, which ſtayeth the little toe, it is inſerted by a round tendon into the outſide of the firſt joynt of the little toe;

The number of the Muſcles of each part.

The eye-lid hath	4
The occipitals on each ſide	1
Each eye hath	6
The noſe hath	6

Theſe are in number 17.

Both the lips have	10
The lower jaw hath	10
The eare hath	10
The tongue hath	8
The bone of the tongue hath	8
The *larynx* hath	10
The *uvula* hath	2
The *pharynx* hath	7

Theſe are in number 65

The head hath	14
The neck hath	8
The breaſt hath	30

The

The loins have	6
The *abdomen* hath	10
The prick hath	4
The *clitoris* hath	4
The ſtones have	1
The bladder hath	1
The *anus* hath	3
Theſe are in number 81	
The ſholder-blade hath	5
The ſhoulder hath	8
The *ulna* hath	6
The *radius* hath	4
The wriſt hath	4
The palm of the hand hath	2
The four fingers have	19
The thumbe hath	5
Theſe are in number 53	
The thigh hath	11
The ſhank hath	13
The inſtep hath	7
The toes have	23
Theſe are in number 54	
The totall ſumme of all the muſcles of the body of man	270

AN

AN ENUMERATION OF ALL THE MUSCLES OF THE WHOLE BODIE.

The muſcles of the eye-lids four in each.

Each *eye* hath one frontall to lift it up: the firſt is called *orbicularis major*, under the frontall; and two called *ciliares*, one in each eyelid to ſhut it.

The occipitals which meet theſe, are two, one on each ſide.

The muſcles of the eares. 10.

As for the *eare*, in the outſide there are foure paire: firſt, *par attollens*, lifting it up: ſecondly, *par deprimens*, pulling it down: thirdly, *par adducens*, which moveth it forward: fourthly, *par abducens*, which pulleth it backward. In the inſide there are two, *externus*, the externall; and *internus*, the internall.

The muſcles of the eye, 6.

The *eye* hath ſix muſcles, foure ſtraight, and two oblique.

The firſt of the ſtraight is called *attollens*, or *ſuperbus*.

The ſecond is *deprimens*, or *humilis*.

The third *Adducens*, or *bibitorius*.

The fourth *Abducens*, or *indignatorius*.

The oblique are two:

1. *Obliquus major, ſeu ſuperior.*
2. *Obliquus minor, ſeu inferior.*

The muſcles of the noſe. 6.

The *noſe* hath ſix muſcles.

Erectores, or pullers upwards two.

Dilatatores, or openers, two.

Conſtrictores, or pullers together two, one in each ſide.

The muſcles of the lips, 10.

The *lips* have two common muſcles, and four proper:

Of the common, the firſt is called *zygomaticus*, the ſecond *bucco*.

Each *lip* hath four proper:

1. *Attollens*, which beareth up the upper lip.

2. *Deprimens*, which beareth the lower lip downwards.

3. *Orbicularis*, or *ſphincter*, which maketh up the fungous ſubſtance of the lips.

4. *Abducens*, or drawing aſide.

The muſcles of the lower jaw, 10.

The *lower jaw* is moved upwards by three muſcles: the *temporalis*, the *pterigoideus internus*, and the *maſſeter*.

It is pulled down by *digaſtricus*, and *muſculus latus*.

It is pulled forward by *pterigoideus externus*.

The muſcles of the tongue, 8.

The *tongue* hath eight muſcles, four on each ſide.

1. *Genioglaſſus*, which draweth it forwards.

2. *Milogloſſus*, it helpeth the thruſting of it out.

3. *Baſigloſſus*, or *hypſigloſſeus*, by the which it is pulled backwards.

4. *Stylogloſſus*, or *ceratogloſſus*, by the which it is moved to the ſides.

The *os hyoides* hath four muſcles on each ſide.

1. Ster-

The muſcles of the bone of the tongue 4.

1. *Sternohyoides:*
2. *Genihyoidæus.*
3. *Coracoidæus.*
4. *Stylоceratoidæus.*

The muſcles of the larynx. 9

The *larynx* hath four common muſcles, and five proper.

Of the common there are,

1. Two *hyothyroidæi*, which pull up the *larynx*.

2. Two *Bronchii*, which pull it down.

Of the proper,

1. *Cricothyroidæus anticus.*
2. *Cricothyroides lateralis.*
3. *Cricoarytenoides poſticus.*
4. *Thyroarytenoides, ſive glottæus.*
5. *Arytenoides.*

The muſcles of the pharynx. 7

The *pharynx*, or beginning of the *æſophagus* hath ſeven muſcles, three paires, and one without a match.

Of the paires.

1. *Shenopharingæus.*
2. *Cephalopharingæus.*
3. *Staphylopharingæus.*

That which hath no match is called *æſophageus.*

The *gargareon* hath two Muſcles.

The muſcles of the *uvula.* 2.

1. *Pteryſtaphilinus externus*, this holdeth it up.

2. *Pteryſtaphilinus internus*, this doth the ſame.

The muſcles of the head. 4.

The *head* hath two ſorts of muſcles: for ſome are common, and ſome are proper: the common, which together with the neck move the head; and theſe are the muſcles of the neck.

Proper muſcles. 14.

The proper are thoſe which onely move the head, when the neck remaineth immoveable: and theſe are in number fourteene. It is pulled forward by the two *maſtoidæi*: theſe are placed before; theſe bend it forward. Behinde twelve are placed.

1. *Splenius, vel triangularis.*
2. *Complexus, vel trigeminus.*
3. *Recti majores*, two
4. *Recti minores*, two; theſe ſtretch out the head.
5. *Obliqui majores, ſive ſuperiores*, two.
6. *Obliqui minores, ſive inferiores*,

feriores, two: theſe winde the head about.

The muſcles of the neck, 8.

The neck hath foure on each ſide.

It is bended by two paires,

1. *Par longum.*

2. *Par ſpinatum*, *triangulare*, *ſcalenum.*

It is extended by two paires.

1. *Semiſpinatum.*

2. *Tranſverſarium.*

Seeing 64. muſcles ſerve for one ſide of the head and neck, there muſt be 128. for both the ſides.

The trunke of the body hath 46 muſcles for one ſide.

The muſcles of the breaſt.

As for the breſt, firſt, theſe dilate it:

1. *Subclavius.*

2. *Serratus major.*

3. *Serratus poſticus ſuperior.*

4. *Serratus poſticus inferior.*

5. *Intercoſtales externi*, fifteene in number, which are as one muſcle.

The breſt is contracted by fifteen in number.

1. *Sacrolumbus.*

2. *Semiſpinatus*, or *triangularis*

3. The internall intercoſtals, in number thirteene.

Diaphragma.

Double this number, and you ſhall have 32.

The loynes are bended by the *triangulares*, one on each ſide.

They are extended by foure, two on each ſide.

The muſcles of the loines.

1. *Semiſpinatus.*

2. *Sacer*: two of them on each ſide.

The *abdomen* hath five on each ſide.

The muſcles of the belly, 10.

1. *Obliquus aſcendens.*

2. *Obliquus deſcendens.*

3. *Rectus.*

4. *Tranſverſalis.*

5. *Pyramidalis.*

The ſtones have two cremaſters to elevate them.

The muſcles of the ſtones, 2.

The prick hath two, on each ſide.

The muſcles of the prick, 4.

1. *Erector*, or *Collaterali*

2. *Accelerator*, or *interior*.

The muſcle of the bladder 1.

The *bladder* hath one, the *ſphincter*.

The muſcles of the *anus*, 3.

The *anus* hath three muſcles: one to purſe it in, called *ſphincter*; and two to pull it up, called *levatores*.

Double this number, and you ſhall have 92.

The muſcles of the Arme.

The Arme hath 44. muſcles.

The muſcles of the ſhoulder-blade, five on each ſide.

The ſhoulder blade hath five muſcles on each ſide.

1. *Trapeſius*, for ſundry motions.

2. The proper *levator*, or lifter up.

3 *Rhomboides* which draweth it backwards.

4. *Serratus minor anticus*, drawing it forewards.

5. *Serratus Major*.

The muſcles of the ſhoulder. 8.

The *brachium* or ſhoulder hath eight.

1. *Deltoides*. 2. *Supraſpinatus*.	moving it upward.
3. *Latiſſimus*. 4 *Rotundus major*.	drawing it downward

5. *Pectoralis.* } pulling it forward.
6. *Coracoides.*

7. *Rotundus minor* } pulling it backward.
8. *Immerſus*, or *infraſpinatus.*

The muſcles of the *ulna*, 6.

The *elboe* hath ten muſcles. The *ulna* hath ſix.

1. *Biceps.* } bend it.
2. *Brachiæus internus.*

3. *Longus.* } extend it.
4. *Brevis.*
5. *Brachiæus externus.*
6. *Angonæus.*

The muſcles of the *radius*, 4.

The *radius* hath four.

1. *Pronator rotundus ſuperior.*
2. *Pronator inferior quadratus.*
3. *Supinator longus.*
4. *Supinator brevis.*

The muſcles of the wriſt, 4.

The *carpus*, or wriſt, hath four muſcles.

1. *Cubitæus internus.* } theſe bend it.
2. *Brachiæus internus.*

3. *Ra*

3. *Radiæus externus, ſive bicornis.*
4. *Cubitæus externus.*
these extend it.

The muſcles of the fingers, 18 in each hand.

The fingers have eighteen muſcles.

1. *Sublimis.*
2. *Profundus*
by theſe they are bended.

3. *Communis extenſor magnus.*
4. Proper to the fore-finger or *indicator.*
5. Proper to the little finger, or *auricularis.*
theſe extend the fingers.

6. *Interoſſei.*
7. *Lumbricales*, 4.
theſe partly part them, partly draw them together.

8. *Abductor digiti parvi.*
9 *Abductor indicis, ſive indicator.*

The muſcles of the thumb, 6.

The thum hath ſix muſcles.

1. *Lon*

1. *Longus.*
2. *Brevis.* } theſe extend it.

3. One it hath to bend it.
4. *Thenar* bendeth it forward.
5. *Antithenar* bendeth it backward.

Double the number of 42. the number of the muſcles of one arm, and you ſhall finde 84. muſcles of them both.

The muſcles of the thigh, 10.

The thigh hath ten muſcles.

1. *Pſoas.*
2. *Iliacus.*
3. *Pectinæus.* } theſe bend it forward.

4. *Glutius maximus*
5. *Glutius medius.*
6. *Glutius minimus.* } theſe bend it backwards.

7. *Quadriceps*, or *quadrigemini*, 4 ſmall muſcles. } theſe bend the thigh outward.

8. *Triceps*, this bendeth it inwards

9 *Obturator internus*, this rowleth it outwards.

10. *Obturator externus*, this rowleth it inwards.

Double the number 10. and you ſhall have 20. muſcles for both thighs.

The muſcles of the leg. Of the *tibia* 11.

The leg hath 42 muſcles.

The *tibia* hath 11.

1. *Seminervoſus.* 2. *Semimembranoſus* 3. *Gracilis internus, ſeu poſticus.* 4. *Biceps.*	theſe bend it.
5. *Membranoſus, ſeu faſcia lata.* 6. *Sutorius, ſive longus.* 7. *Vaſtus externus.* 8. *Vaſtus internus.* 9. *Rectus gracilis.* 10. *Crureus.*	theſe extend it.

The muſcles of the feet, 9.

11. *Suppopliteus*, or *popliteus*, this moveth it obliquely.

The inſtep hath eight muſcles.

1. *Tibiaus.*

1. *Tibiæus anterior.* 2. *Peronæus anterior.*	theſe bend it.
3. *Gemelli duo*, or the twins. 4. *Plantaris.* 5. *Solæus.*	theſe extend it.
6. *Tibiæus poſticus.* 7. *Peronæus poſticus.* 8. *Plantaris.*	theſe move it obliquely.

The toes have eighteen muſcles.

The muſcles of the toes, 23.

1. *Longus.* 2. *Brevis.*	theſe bend them.
3. *Sublimis.* 4. *Profundus.*	theſe extend them.

5. *Interoſſei* eight, theſe bring them together and ſever them.

6. *Lumbricales* foure. 7. *Caro muſculoſa*, or the muſculous fleſh. 8. *Tranſverſalis.* 9. The drawer in of the little toe.	theſe draw them together.

The muſcles of the great toe, 4.

The great toe hath foure muſcles.

1. *Extenſor*, or extender.
2. *Flexor*, the bender.
3. *Adducens*, that which draweth to the reſt.
4. *Abductor minimi digiti*, that which draws the little finger from the reſt.

Double the number of 42 expreſſing the number of the muſcles ſerving for one Leg, and you ſhall have the number of 84. which is the number of the muſcles of both the Legs.

The Explication of ſome Appellations of the Muſcles, and ſome other parts of the BODIE.

ANcyroides, *anchor like.*

Ancon, *the bending of the elbow.*

Acromium, *the upper part of the ſhoulder blade.*

Arytenoïdæus, *becauſe it beginneth and endeth in the ewarlike cartilage.*

Bronchus, *the lower part of the windepipe.*

Biceps, *becauſe it hath two heads.*

Cerategloſſus, *becauſe it ariſeth from the points of the bone of the tongue, & is inſerted into the tongue.*

Coracohyoidæus, *becauſe it ſpringeth from the proceſſe of the ſhoulderblade like the crowes bill,* *and is inſerted into the bone of the tongue.*

Cephalopharingæus, *becauſe it beginneth where the head is joyned to the neck by the firſt* vertebra, *and is inſerted into the* pharinx.

Crycothyroidæus, *becauſe it ſpringeth from the ring-like cartilage, and is inſerted into the* thyroides.

Crycoarytenoidæus, *becauſe it beginneth at the ring-like, and endeth at the ewarlike cartilage.*

Corone *is the proceſſe of the lower jaw.*

Coracoides, *like the crowes bill.*

Cremaſter, *it holds up the ſtone.*

Deltoides, *becauſe it is like to the Greeke letter* Δ.

Geneogloſſus, *becauſe it hath its beginning from the chin, and is inſerted into the bone of the tongue.*

Gluteus, *becauſe it maketh up the buttockes.*

Gaſtrocnemius, *becauſe it maketh up the calf of the leg*

Hypſilogloſſus, *becauſe it hath its beginning from the bone of the tongue,*

tongue & is inſerted into the tongue.

Hyothyroidæus, *becauſe it ſpringeth from the bone of the tongue, and is inſerted into the buckler like cartilage.*

Larynx *is the beginning of the winde-pipe, derived from* λαρυγγίζειν, *which is to ſhout with an open mouth. It is framed of foure cartilages: the firſt is* Thyroides, *buckler-like: the ſecond and third is* Arytenoides; *ewar-like: the fourth is* Cricoides, *ring-like.*

Myloglоſſus, *becauſe it hath its beginning at the root of the grinders of the lower jaw, and is inſerted into the tongue.*

Maſtoidæus, *becauſe it is inſerted into the dug-like proceſſe of the tempil.*

Maſſeter, *becauſe it ſerves for eating.*

Pharynx *is the throat.* Pſoa, *becauſe it is clipped in embracing.*

Rhomboides, *becauſe it is like the mathematicall figure called* rhombus, *having foure lines, but not the foure ſides equall.*

Sternohyoidæus, *becauſe it hath its beginning from the* Sternum, *and is inſerted into the bone of the tongue.*

Styloceratohyoidæus, *becauſe it ſpringeth from the bodkin-like progreſſe, and is inſerted into the points of the bone of the tongue.*

Sphænopharingæus, *becauſe it ſpringeth from the wedge-bone, and is inſerted into the* pharynx

Stylopharingæus, *becauſe it beginneth at the bodkin-like proceſſe and is inſerted into the* pharynx.

Styloides, *becauſe it repreſenteth the pin of a Table-booke, or a needle.*

Sternohyoidæus, *becauſe it beginneth at the* Sternum, *and is inſerted into the bone of the tongue.*

Spinatus, *which is placed by the ſharp brim of a bone.*

Sigmoides, *which is like to the Greeke* Σ.

Sphænoides, *the wedge like bone.*

Sphincter, *the drawer together.*

Thyroaritenoidæus, *becauſe it beginneth at the bucklerlike cartilage, and endeth in the ewarlike.*

Trigeminus, *which hath three beginnings.*

Trapezius, *becauſe it hath foure ſides bounded with unequall lines: for the Geometers ſo call ſuch a figure.*

The explication of the fourth Fignre.

1. *The bones of the head.* 2. *The bones of the chain of the back.* 3. *The ſhoulder-blade.* 4. *The ribs.* 5. *The* os ſacrum. 6. *The thigh-bone.* 7. *The bones of the knee.* 8. *The bones of the legs.* 9. *The bones of the feet.*

Fig. IV.

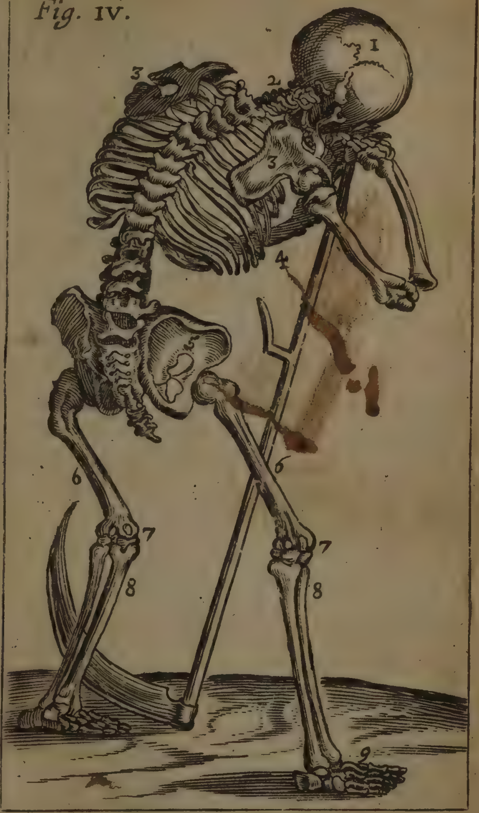
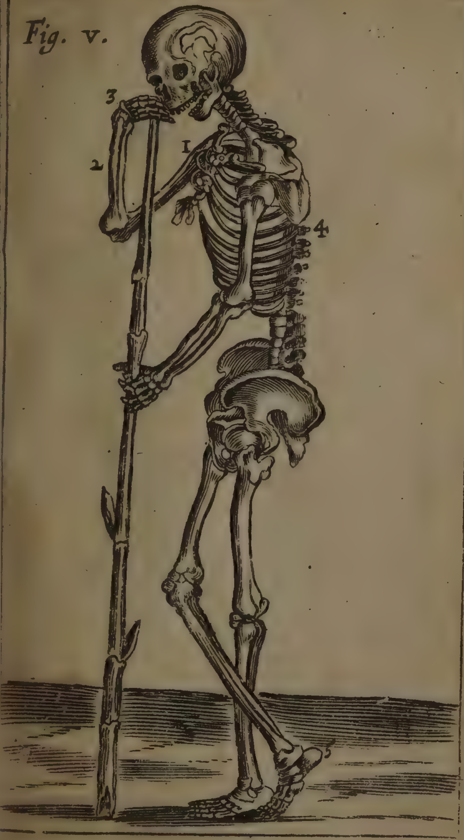


Fig. v.



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The explication of the fifth Figure.

1. *The ſhoulder-bone.* 2. *The elbow-bones.* 3. *The bones of the hand.* 4. *The bones of the backe.* 5. *The heele-bone.*

Theſe two figures are to be placed in their order immediately before the firſt Chapter of the book of bones.

The fourth BOOKE Of the BONES.

CAP. I.

Of the nature of a Bone.

TO the perfecting of a bone four cauſes concur. Firſt, the efficient cauſe; which is the oſſifick faculty of the ſpirit, unto which the naturall heat miniſtreth. Secondly, the materiall cauſe; which is twofold: The one is of the generation, the other of the nutrition of the bone. The matter of generation is the thickeſt part of the ſeed: The matter of nutrition is blood, with the which all parts of the body are nouriſhed; and not the marrow. For firſt, ſmall bones have no marrow. Secondly, the marrow is hot and moiſt, but the bones cold and dry. The veins and arteries, which carry this nutrimentall blood, are placed in the ends of the bones, as in the ſcull, thigh-bone, and the great focill of the legge. The marrow ſerveth for the moiſtening of the bones, which are dry and ſtill in motion. No nerves paſſe to the bones; for they onely feel by the benefit of the *perioſtium*. Thirdly, the formall cauſe is twofold: by the eſſentiall it is cold and dry; the accidentall is the figure, which for the moſt part is either round or flat. Fourthly, the finall cauſe is double: the generall, which ſerveth the whole body; and it is threefold: Firſt, they eſtabliſh the ſoft parts: Secondly, they give figure to the parts: Thirdly, they further the motion of the body.

Lib. de oſſib. ad Tyron.

The ſpeciall is that which is proper to every particular bone. Of the premiſes ſuch a deſcription of a bone may be gathered : *A bone is a ſimilary part, moſt dry and cold, inflexible, compacted of the thickeſt part of the ſeed by the ſpirit, the naturall heat concurring, to afford ſtableneſſe and figure to the whole body.*

CAP. II.

Of the naturall affections of Bones.

THeſe affections are either common to all bones, or proper to ſome only.

The common are nine. For firſt, a bone muſt be hard, the better to ſtay the body : Secondly, without it muſt be ſlippery, for ready motion : Thirdly, it muſt be white, becauſe it is a ſpermatick part and nouriſhed by blood. Fourthly, it muſt be diſtitute of feeling, for avoiding of pain in motion.

motion. Fifthly, it muſt be either hollow or ſpongious, to contain a marrowy ſubſtance, for moiſtning of them. Sixthly, it muſt be tipped in the ends with a cartilage, and be bedewed with an unctuous humour, to procure an eaſie motion. Seventhly, that it be covered with a membrane, to preſerve it from carioſity, except the three bones of the eare, and the parts of the teeth above the gummes. Eighthly, that about the ends it have holes, to admit veins and arteries for nouriſhment. Ninthly, that it be equall. Wherefore the *callus* wherewith a broken bone is united, and nodes in the pox, are not naturall affections. By theſe you may pronounce a bone to be ill affected: Firſt, if it be ſoft; becauſe it muſt cauſe the member to be too flexible. Secondly, if it be dry; for then it is diſtempered. Thirdly, if it be white; for then it is dead. Fourthly, if it be black; for then it is carious. Fifthly, if its figure be altered;

tered; for then it muſt hinder the action of the part.

The proper affections are four: The firſt is a cavity; and it is twofold: for it is either deep, and it is called *cotyle*; or ſhallow, and it is called *glene*. The ſecond is a bunching out; and it is either harder than the reſt of the bone, and it is called *apophiſis*; or it is ſofter and it is called *epiphiſis*. If the bunching out be round, it is called *caput*; under it is the *cervix*, as in the upper end of the thigh-bone, If it be flat, it is called *condilus*: if pointed, *corone*. Other protuberancies are named from the ſimilitude they have from other things; as *ſtyloides*, bodkin-like; *coracoides*, crow-like, &c. The third is inequality: this is ſeen in the nowl for the inſertion of muſcles. The fourth is ſmoothneſſe, as the reſt of the skull.

CAP.

CAP. III.

Of the differences of the joyning of bones togethers

THey are coupled together either by joynting or growing together. Jointing is either for manifeſt or obſcure motion. The jointings which ſerve for manifeſt motion are three. Firſt, *Enarthroſis*, and it is when a large head of a bone is received in a deep cavity, as the thigh-bone in the hip bone. Secondly, *Artbrodia*; it is when the cavity which receiveth is ſhallow, and the head of the bone which is received ſhallow: ſuch is the articulation of the lower jaw with the tempil-bone. The third is *Ginglymos*; when the ſame bone receiveth, and is received. This falleth out three manner of wayes; firſt, when the bone is received by another, and receiveth the ſame; this is ſeen in the articulation of the ſhoulder-bone with the elbow.

bow-bone. Secondly, when a bone receiveth one bone, and is received by another: this may be ſeen in the ſpondils of the back, where the middle bone receiveth the upper, and is received by the lower. The third is, when the proceſſe of the bone being long and round, is inſerted into another upper bone, and ſo is turned in the cavity as if it were in an axle-tree; ſo is the ſecond *vertebra* of the neck with the firſt.

Articulation for obſcure motion may be obſerved in the articulation of the ribs with the ſpondils, and in the bones of the wriſt and ankle.

Bones grow together either without ſome middle ſubſtance, or with it: Without ſome middle ſubſtance they are coupled three manner of wayes. Firſt, by a line, as the bones of the upper jaw and noſe are coupled: this is called *harmonia*. Secondly, by a ſuture, as the bones of the ſcull are united. Thirdly, when one bone is faſtened in another, as a nail in wood; and ſo are the teeth faſtened in the gums: this is called *gomphoſis*. If bones grow together by a middle ſubſtance, it is either by a cartilage; and ſo are the ſhare-bones joyned: this unition is called *ſynchondroſis*: or by a ligament, and ſo the thigh is joyned with the hip-bone: this is called *ſynneuroſis* Or laſt of all, by fleſh, and ſo is the bone of the tongue to the ſhoulder: this is termed *fyſſarcoſis*.

The uſes of the coupling of bones are theſe. Firſt, for motion. Secondly, for perſpiration, as in the ſutures of the head. Thirdly, to give way to the paſſing of ſome ſubſtance, as the ſame ſutures to give way to the *dura mater* to make the *pericranium*. Fourthly, for ſecurities ſake, as one may ſee in a member where many bones are. Fifthly, to put a difference between parts, as we perceive in the bones of the upper jaw.

CAP.

CAP. IV.

Of the ſutures of the head.

THe bones of the whole body belong to theſe foure parts of it; the head, neck, the breſt, the lower belly: and the lims. The head is that part which is above the *vertebræ* of the neck: of it there are two parts, the ſkull, and the jawbones. The ſkull is that bony ſubſtance which containeth the brain, and is decked with haire. In the deſcription of the bones of the head theſe two things are to be noted; the ſutures, and the number of the bones. The ſutures are either proper, or common: the proper are thoſe which joyne the bones of the ſkul one with another; and they are either true ſutures, or counterfeit. The true are thoſe which repreſent two combes joyned together by their teeth, theſe are three in number: the firſt is *coronalis*: It is ſeated in the fore-part, and paſſeth from one tempil to the other tranſverſly. The ſecond is *lambdoides*, oppoſite to this, reſembling the Greek letter Λ. The third is *Sagittalis:* this uniteth both, and begining at the top of the *lambdoides*, reacheth ſometimes to the noſe.

The counterfeit, or *mendoſæ* reſemble a line onely. The remarkable of theſe are the *ſquamoſæ*, or skale like ſutures: theſe unite the bones of the tempils with thoſe of the *vertex*, or top. They are two, one above each eare: they begin from the backſide, in the lower part of *proceſſus mammillares*, and paſſe through the whole ſide of the skull. The common ſutures are thoſe which belong to the skull, the wedgelike bone, and the upper jaw. The moſt remarkable are theſe: firſt, *frontalis*, by the which the outer proceſſe of the *os frontis* is joyned with the firſt bone of the upper jaw. The ſecond is *cuneiformis*, by the which the wedgelike bone, it being in the middle of it, is joyned with the firſt bone of the upper jaw. The third is *cribroſa*: this is common to the wedge-like bone, and the *ſeptum*, or partition of the noſe. The ſutures have three uſes: the firſt is to ſtay the braine from tottering by ſtaying of it, by ſending ſome fibres from the *dura mater* through the ſutures. The ſecond, to breath out the vapour ſent unto the braine from the lower parts. The third to ſtay fractures from going further.

Cap. V.

Of the proper bones of the head.

THeſe are in number ſix, one of the forehead, another of the noddle, two of the crown, and two of the temples. Firſt, *os frontis*, the forehead-bone: It is bounded by the coronall and firſt common ſuture, before, and in the ſides by the temporall bones. It is but one in thoſe of ripe age, but double in children, being divided by a ſuture paſſing from the coronall to the noſe. On each ſide of this bone in the upper part of the eye-browes, there is a large cavity and often two, from whence two holes paſſe to the hollowneſſe of the noſe.

Theſe cavities containe a clammy ſubſtance, kept in by a greene membrane. This receiveth the aire containing in it ſome odour received by the noſe to ſtay it a while before it be ſent to the braine. It hath two holes in the middle part of the eie-brow, which goe to the orbit of the eie; by the which, the firſt branch of the nerve of the third conjugation of the braine to the muſcle of the forehead. It hath alſo foure proceſſes; the greater two are ſeated about the greater corner of the eie, but the leſſer two about the leſſer corner.

The bones of the crowne are in number two: Before they are joyned with the bone of the forehead, by the coronall ſuture, with the noddle bone by the ſuture *lambdoides*, to the tempil-bones, by the *ſuturæ ſquamoſæ*, without they are ſmooth, but within unequal, by reaſon of the prints which the jugular veins of the *dura matur* leave.

Under theſe are the bones of the tempils. They are joyned with the bones of the crowne by the *ſuturæ ſquamoſæ* in the ſides; before with the firſt bone of the upper jaw by its firſt proceſſe, to the nowle-bone, by the counterfeit ſuture. Theſe bones are thin in the upper part like a skale; but below thick, hard, and unequall, or rough, wherefore they are called *Petroſa*, rocky. In theſe are *meatus auditorii*, by the which the ſounds paſſe to the braine. Of the furniture of this paſſage, peruſe *lib.* 3. *cap.* 23. of the inward parts of the eare. Theſe bones have ſundry holes for the letting of veſſels to the braine.

The nowle-bone called *os occipitalle* is joyned to the crowne-bones, by the ſuture *lambdoides*.

It is the thickeſt of all the bones of the head. It is ſmooth without; but hath ſundry ſinuoſities to receive the meninges ſafely: through the great hole of this bone the *ſpinalis medulla* paſſeth to the back-bone.

Theſe bones of the skull have two tables: The uppermoſt is hardeſt, thickeſt, and ſmootheſt. The lower is unequall, and pitted to give way to the veſſels diſperſed through the *dura mater*. Between theſe two tables there is a certaine ſpongious ſubſtance, marrowie, and red, for the nutrition, and humectation of the bones. It is red, by reaſon of the ſmall veins paſſing that way: this ſubſtance hath a threefold uſe: firſt, it receiveth blood for the nutrition of the skull. Secondly, in fractures of the skull, it cauſeth the *porus ſarcodes* the ſooner to grow. Thirdly, it furthereth the diſcharging of vapours from the braine.

Cap. VI.

Of the bones common to the skull and upper jaw.

Hitherto of the bones proper to the skull: Now follow thoſe which are common to it and the upper jaw: theſe are three: Firſt, the wedge-like bone, or *cuneiforme*; ſo called, not that it is like a wedge, but that it is ſeated in the middle of the bones of the skull and the upper jaw. Before it is joyned with the forehead bone, by a baſtard, as alſo to the nowle-bone. At the ſides it doth accompany a good way the *os petroſum*, from whence it is ſeparate by a rough chink. Above, it doth touch the firſt, fourth, and ſixth bone of the upper jaw; below, it toucheth the bones of the palate of the mouth by the wing-like proceſſes. It is thick and ſolid where it maketh the baſis of the skull; it is the thickeſt of all the bones of the head. Where there is a cavity, like to thoſe above the eyebrowes, of the proceſſes of it, within the skull, *Sella Turcica*, the Turkiſh Saddle is framed. In the middle of it the *glandula pituitaria*, which receiveth the pituitous excrements falling from the braine. Without the skull you ſhall finde one on each ſide, about the ſides of the holes of the noſe like unto the wings of a Bat; and from thence called *proceſſus aliformes*. It hath ſundry perforations, by the which the motorie and opticke nerves of the eye, and other nerves for the motion of other parts, as veſſels, alſo veines and arteries for nouriſhment paſſe. The ſecond common bone is *os cribriforme*, becauſe like a ſive, it hath many holes: by theſe, ſmells paſſe to the braine. A proceſſe like to the combe of a Cocke, and therefore called *criſta galli*, divideth the upper part. Another thin bone paſſeth above to the inſtruments of ſmelling and below to the noſtrils, dividing the noſe in two parts, the right and the left called *ſeptum naſi*. This bone giveth way to the diſcharging of the excrements of the braine.

The third common bone is *os jugale*, or the yokebone. It is placed on every ſide of the face between the cavity of the hearing and the firſt bone of the upper jaw. It is framed of two bones: the hinder is a proceſſe of the templebone about the paſſage for hearing: the forebone is a proceſſe of the firſt bone of the upper jaw, which maketh the leſſer corner of the eye. Theſe two bones are joyned by an oblique ſuture, and make the yoakbone; becauſe like a yoak it ſtayeth the ſides of the upper jaw. It ſtrengthneth the tendon of the temporall muſcle which paſſeth to the lower jaw, and the muſcle *maſſeter*.

CAP. VII.

Of the jawes.

Now follow the bones of the face; they are the jaw bones, the teeth, and bone of the tongue. The jawes are two, the upper and lower. The ſubſtance of the upper jaw is not ſolid, but ſpongious, as the pumix ſtone; and unequall, becauſe it is framed of ſundry bones; they are ſixe paire, ſixe in each ſide. The firſt is *zygomaticum*: It maketh up the beſt part of the yoake-bone, the outer corner of the eye, and a great part of the orbit of the eye. *Zygoma*, or the yoake-bone, is nothing elſe but a bonie halfe circle made of two proceſſes: whereof the one proceedeth from the *os petroſum*; but the other is a portion of the cheek-bone. The ſecond is *os lachrymale*, it is a round, little, aud thin bone in the inner corner of the eye, wheron the *caruncula lachrymalis* reſteth.

reſteth in the lower part of it there is a hole which paſſeth to the cavity of the noſe : by this the third branch of the third pair of ſinewes of the braine paſſeth to the inner membrane of the noſe. The third is thin as the former ; but quadrangular. It is joyned with the bone of the forehead , and the wedge-like bone. The fourth is *os malæ*, the cheek-bone, the greateſt and thickeſt. This containeth all the upper teeth , and maketh up the holes of the noſe , and moſt of thoſe bones which belong to the upper part of the face. It is joyned above with the bone of the forehead, but below with the wedge-like bone ; before with the *os lachrymale*, behinde with the third, and laſt of all with its fellow. The fifth is long, hard, reaſonable thicke ; it maketh up the bony part of the noſe. It is joyned with the cartilages of the noſe below ; but to the internal proceſſe of the *os frontis* above. The ſixth doth make up the roofe of the mouth with its fellow. Six bones then make up the orbit of the eye. The firſt is *Frontale*, which maketh the upper vaulted part. The ſecond is placed in the outſide where the leſſer corner is, and is a portion of the wedge-like bone. The third maketh up the outſide concurring with the former portion of the wedge-like bone. The fourth and fifth make up the inſide. The ſixth maketh up the lower part. Theſe within the orbit are diſcerned partly by common, partly by proper ſutures.

The lower jaw in thoſe of ripe age is but one bone; but in beaſts it is compacted of two bones. It reſembleth the Greek letter υ, or a bow: that portion which pointeth out in the arched part is called the chin. At both the ends of it there are two proceſſes whereof the one is ſharpe, and is called *corona*: and receiveth the tendon of the temporall muſcle. The other may be called *articularis*, becauſe it ſerveth for articulation. Within this jaw there is a long cavity which ariſeth at the roots of theſe proceſſes. By it is the third branch of the third paire of ſinewes of the braine, together with a veine and artery to the teeth. This may be found out by a ſmall copper wire. This only is moveable, and both have ſockets for the teeth; they are in number equall with the number of the teeth; they are enlarged by the teeth, and when in old age the teeth fall out, the ſockets draw together, and become ſharp.

Cap. VIII.

Of the teeth.

THe teeth are placed in the gummes. Their articulation is not uniform; for they are infixed into the gummes as a nail to a poſt by *gomphoſis*. Their root is tyed to the mandible by a nerve, for ſteadineſſe, by *ſinneuroſis*; and the upper part compaſſed by the fleſhy ſubſtance of the gumme, by *ſyſſarcoſis*.

One thing is to be noted, That the Cutters and Dogges-teeth ſometimes are implanted into the gummes by a crooked phang: whereby it falleth out, that when ſuch teeth are drawn, the ſocket muſt be fractured.

Their ſubſtance is hardeſt of all other bones; yet they do grow: for if a tooth in either gumme be drawn, the tooth oppoſite to it will in time fill up the vacuity left after the drawing of the other. Their figure repreſenteth a naile; for in the top they are flat, and in the root ſharp. Towards the root they have a cavity compaſſed every way by a membrance, by the which they have an exquiſite ſenſe of feeling: the firſt qualities, heat and cold, much affect them, by reaſon of the membrane; yet ſecond qualities, as hardneſſe and ſoftneſſe, do not offend them.

The teeth have veins from the jugulars, arteries from the ſoporals, and nerves from the third conjugation. Seeing theſe veſſels proceed from the principall parts, the liver, heart, and brain : it is no wonder that children when they breed teeth are troubled with fevers, lasks, and convulſions; the principall parts be effected by conſent.

As for the number of them, commonly there are found ſixteen in each gumme. If there fall out any diffierence in individuall perſons, it falleth out by reaſon of the *molares.*

There are three ranks of teeth: Thoſe of the firſt ranke are called *inciſores*, Cutters. Moſt commonly foure are found in each jaw: they have but one phang, and ſo eaſily fall out. Theſe firſt make way out of the gummes, becauſe the tops of them are ſharpeſt. Thoſe in the ſecond rank are called *canini*, or Dogges-teeth, from their length, hardneſſe and ſharpneſſe above the reſt. In each jaw there are two; at each ſide of the cutters one; they are called eye-teeth, not that they reach to the orbit of the eye; for they mount no higher then the no-

noſtriles; but becauſe ſprigs of the nerves which move the eyes, are carried to them. Thoſe in the third ranke are called *molares*, grinders; Becauſe as mills they grinde the meat. Moſt commonly they are twenty in number, five in each ſide of every jaw: Of theſe the foure next to the Dogge-teeth are prefected in the youth; but the other two come not out untill the twenty eight, or thirty yeares, yea, ſometimes the old age it ſelfe come on. In ſome they never appeare. They are called the teeth of wiſdome. Theſe have more roots than the other. Thoſe of the upper jaw have more fanges than thoſe of the lower jaw; firſt, becauſe they hang: ſecondly, becauſe the ſubſtance of the upper jaw is not ſo firme as that of the lower. The two of the upper jaw next to the *canini*, have two fanges, the reſt three. Thoſe next to the Dogs-teeth in the lower jaw have but one fang, and the reſt but two.

The uſe of the teeth is to chew

the meat to prepare it for the ſtomacke to make a laudable *chylus*; wherefore the cutters pull the meat aſunder; the Dog-teeth breake it, and the grinders make it ſmall, wherefore they are flat in the top, that they may receive and keepe the meat, and rough, that they may bruiſe it the better.

The teeth come out in man the ſeventh month, and ſometimes more ſlowly, but in beaſts ſooner, becauſe they are to eat ſolid meat. Of theſe teeth, ten in each gumme, to wit, the foure cutters, the two Dogges teeth, and foure grinders doe caſt. The fore teeth caſt the fourth, fifth, and ſixth yeares of the age, the hinder ſlower.

CAP. IX.

Of the Bone of the Tongue.

THis bone is ſeated under the lower jaw, in the uppermoſt part of the *Larynx*. It is like to the Greek vowell *v*, or the lower jaw; becauſe it is arched before, and ſpread like hornes behind. There are three parts of this bone. The firſt part upholdeth the tongue, which reſteth upon the upper part of it, and is called *baſis linguæ*. The other two are laterall, and are called *cornua*, or hornes. Theſe bones are tied to the adjacent parts, partly by a fleſhy, partly by a nervous ſubſtance. This bone ſerveth to keep the throat open, that the meat may deſcend into the ſtomack, and the ayre have paſſage to the wind-pipe while we ſpeake and breathe.

CAP. X.

Of the bones of the Neck.

Hitherto then of the bones of the head, now follow the bones of the neck.

They are of two ſorts, to wit, the *clavicula* or cannell bones, and the *vertebræ.* They are called *claviculæ*, becauſe they repreſent the figure of keys uſed in ancient times. They are like the great Roman S, for they ſeeme to bee framed of two ſemicircular bones: but placed one oppoſite to another. The ſubſtance of theſe bones is hollow, but more about the heads, and leſſe about the middle. In number they are two, one on each ſide. Neere the throat they are round; but towards the ſhoulder flattiſh. They are tied to two bones, to wit, to the ſhoulder-blade, and the breaſt-bone. The uſe of them is to uphold the ſhoulder-blades, that they ſhould not fall upon the breſt together with the ſhoulder-bone; which falleth out when there is a fracture in them.

The *vertebræ* of the neck are in number ſeven. The bones of theſe are harder than of the other, becauſe they are more moved. Theſe have firſt a large hollowneſſe to give way to the *ſpinalis medulla*:

then two holes in the tranſverſe proceſſes, one in each ſide, through which veines and arteries paſſe to the head. Theſe *vertebræ* being uppermoſt are leſſer then the reſt. They have proceſſes oblique, tranſverſe, and thoſe behinde. Theſe laſt are forked, if you except the firſt and laſt two. The firſt *vertebra* hath no ſharpe corner, leſt the two ſmall muſcles of the head, ſpringing from the ſecond *vertebra*, ſhould be hurt when the head is ſtretched out; upon this the head is moved forwards and backwards. The ſubſtance of this is harder, ſolider, and thinner than that of the reſt, becauſe it is the leaſt, and the cavity of it is biggeſt. The *ſinus* of it which receiveth the tooth-like proceſſe, is garniſhed with a cartilage round, where the proceſſe is. Here the head is turned round. As for the ſecond, out of the middle of it the tooth-like proceſſe doth ſpring long and round. It is joyned with the firſt *vertebra* by a broad ligament compaſſing it. If a luxation happen here, it is deadly. The foure that lie under theſe, in all things are like the reſt: their laterall proceſſes are large, and parted at the ſharpe corners, to receive the more muſcles. The ſeventh is the largeſt of all. It is like to the *vertebræ* of the breſt; for it hath neither tranſverſe proceſſes, neither is the hindermoſt forked.

CAP. XI.

Of the vertebræ of the breſt.

THE bones of the breſt are the *vertebræ*, the ribs, and breſt-bone: As for the *vertebræ*, they are twelve in number, unto which ſo many ribs anſwer; whereof ſeldome doth one abound, more ſeldome lack. Their bodies are round in the fore-part; but behinde ſomewhat hollow. As for proceſſes, they have foure oblique, ſerving for ſtrong articulation, two laterall, and one ſharpe behinde, not divided. They have two hollowneſſes, on each ſide one, lined with a cartilage to receive the tops of the ribs. As for holes, they have one large in the middle, which containeth the marrowy ſubſtance, and two leſſer, beſides on each ſide one.

One thing is to be noted, that the twelfth *vertebra* is not joyned as the reſt by *gynglymos*, but by *arthrodia*. Wherefore extending, bending, and turning are performed by this *vertebra*.

CAP. XII.

Of the Ribs.

THe ribs are twelve in number. Their ſubſtance is partly bony, partly cartilaginous; the firſt ſerving for firmneſſe; the ſecond for articulation. The bony ſubſtance towards the *vertebra* is thick and roundiſh, bnt towards the *ſternum* flat and thin. The cartilages in bigneſſe anſwer the bigneſſe of the ribbes: for the bigger ribs have the bigger cartilages, and by the contrary. The ribs in the upper part are blunt, but in the under ſharper. In the lower part they are grooped to receive the intercoſtall veſſels, the veins, arteries, and nerves.

Theſe ribs are of two ſorts; for they are either long or ſhort: the long reach to the breſt-bone, and cauſe a circle: they are ſeven in number. Theſe are articulate with the breſt-bone by *arthrodia*; for in the breſt-bone there are ſundry cavities, which receive the cartilaginous tops of them. To the *vertebræ* they are joyned, their ends cartilaginous being received in the hollowneſſe of the *vertebræ*, and are ſtrengthened by ligaments.

The ſhort are ſemicircular; without, arched; within hollow. The uppermoſt and lowermoſt are ſhorteſt, but the middle longeſt.

Theſe in the forepart bend upwards, and are joyned to themſelves, and the cartilages of the long ribs, if you except the twelfth. In the hinder part they are articulate and ſtrengthened as the long; but the eleventh and twelfth ſtick in the *vertebræ* by one top onely The uſe of the ribs is; firſt to be a defenſe to the heart and lungs; ſecondly, to further the motion of the breſt; for they ſtrengthen the fleſhy parts.

CAP. XIII.

Of the Breſt-bone.

THis is not one entire bone, but is framed of three; whereof the uppermoſt and lowermoſt are alike in all ages, and but one. The ſecond in infants is compoſed of three bones, which become one, the ſeventh yeere of the age being expired. In children all theſe bones are griſtly, but afterward become bony: In aged perſons it ſeemeth one bone, yet it is diſtinguiſhed by three tranſverſe lines, ſhewing the firſt diviſion, which are more conſpicuous in the inſide than outſide. Theſe bones are of a red fungous ſubſtance, full of ſmall holes: the upper part is more hard then the lower.

The upper bone is thickeſt and broadeſt; it hath in each ſide a long cavity, lined with a cartilage to receive the points of the cannell bones; betweene theſe is a pit called *jugulum*. The ſecond bone is neither ſo thicke nor broad, yet foure times as long; it receiveth in its cavities the cartilages of the third, fourth, fifth and ſixth, ribs. The third is leaſt of all, yet it is broader than the ſecond, unto the lower part of which it is joyned. To the end of this is annexed the cartilage called *mucronata*, or *enſiformis*, or ſword like: but the whole breſt-bone compacted of three bones doth reſemble the handle of a ſword, which in ancient times was uſed, being half moonlike in each ſide. Under this is the pit of the ſtomack, where the upper and left orifice of it is called *ſcrobiculus cordis*. The Ancients called this orifice *cor*, or heart, becauſe the pains of it are like the paines of the heart, and called *cardialgia*.

Cap. XIV.

Of the vertebræ *of the Loines.*

THe bones belonging to the lower belly are theſe ; five *vertebræ*, *os ſacrum*, *os coccygis* and *os iſchii*. The *vertebræ* of the loins are in number five ; they are larger than thoſe of the breſt, becauſe they uphold them ; and the lowermoſt of them are biggeſt. They are long and ſemicircular : their ſubſtance is ſpongious, like a pumick ſtone, and full of holes, to give way to the veines. They have one large hole, to give way to the *ſpinalis medulla* ; and two ſmall, by the which nerves paſſe to the adjacent parts, and veins and ateries come in. As for the proceſſes, the upper and lower differ from thoſe of the breſt: for in thoſe the upper parts were knobby, but the lower hollow; but in theſe the contrary is ſeene; for the upper parts are hollow, and the lower knobby. The tranſverſe are long and ſmall. The hindermoſt are ſhort and ſtrong. In the backpart of theſe there is a rough hollowneſſe to receive *os ilium.*

CAP. XV.

Of the os ſacrum; *and rump-bone.*

IT is ſo called from the bigneſſe. The Latines imitating the Greekes called things large *ſacra.* This is the broadeſt of all the bones of the backe, and doth uphold the whole frame of the *vetrebræ.* In infants it is compoſed of five bones, moſt commonly united by a cartilage; but in men of ripe age it ſeemeth but one bone. Theſe bones are *vertebræ*, for each of them hath a body and proceſſes, and hath a large hole to receive the *ſpinalis medulla*. In this theſe differ from the other *vertebræ*, becauſe in thoſe the lower part is bigger, but in theſe leſſer; wherefore the uppermoſt is the biggeſt, and the loweſt the leaſt. Theſe have a large hole to receive the *ſpinalis medulla*, and other leſſer framed of the unition of the *ſinus* to ſend out nerves. As for the proceſſes, the oblique can hardly bee diſcerned but in the firſt. The tranſverſe are long, ſo united that all ſeeme but one. The upper part is thickeſt; the hindermoſt are like the *ſpinæ* of the loynes, but leſſe, and the lower the leſſer; inſomuch that the lowermoſt hath no proceſſe, but a round bunching out.

To the *os ſacrum* the rump-bone is joyned by a cartilage: for the firſt bone of it hath a ſmall hollowneſſe which receiveth the laſt *vertebra* of *os ſacrum*. It is called *os coccygis*, the Cuckoes bill, from the likeneſſe of it. It is framed for the moſt part of three bones, whereof the lower is ſtill leſſer. In men it is bent inward to ſtay the ſtraight gut, and the ſphincter muſcle which are tyed to it; but in women outward, to give way to the matrix in the time of birth. The bones of this are ſpongious and ſoft, and have neither proceſſe nor any hollowneſſe. Their union with the *os ſacrum*, is looſe to give way to great excrements when they come out; for otherwiſe a luxation might be procured, as in hard labour ſometimes it falleth out.

CAP. XVI.

Of the Hoop bone.

THis bone is called *os innominatum*, or without any proper name by ſome; but by the moſt learned *os iſchii.* I have termed it the hoope-bone, partly becauſe it ſtrengthneth the *os ſacrum*, upon which all the *vertebræ* of the back doe reſt; Partly becauſe the motion of the inferior bones are ruled by the muſcles which ſpring from this bone. In children it appeareth framed of three bones, joyned by a cartilage, untill the ſeventh yeer; but in men of ripe age theſe three, the cartilage being dryed, ſeem but one entire bone. The firſt is called *os ilium*, the huckle-bone, becauſe under it lyeth the ſmall gut called *ilium.* This is the broadeſt, and greateſt in figure, ſemicircular, arched without, within hollow. The ſemicircle is called *ſpina*, the arched part *dorſum*, the hollow part *coſta.* It is joyned with the *os ſacrum*, and this to it, by mutuall proceſſes and cavities. The ſecond is called *os coxendicis*, or the hip-bone. This being placed betweene the huckle and ſhare-bones, receiveth in its cavity the thigh bone. This cavity is large, and hath brimmes, and is covered with a cartilage. The third bone is *os pubis*, and *pectinis*, or the ſhare-bone; it is ſeated in the fore-par, in the middle it is parted by a cartilage not very hard. Theſe three bones, together with the *os ſacrum*, make that cavity which is called *Pelvis*, which is bigger in a woman than in a man ; in it are contained the guts, bladder, and part of the *matrix*, wherefore it is a ſhield for them. In hard labour the ſhare-bones and the *os ſacrum* will part; the cartilages and ligaments, being bedewed with ſuperfluous humidity, giving way.

CAP. XVII.

Of the ſhoulder-blade.

NOW follow the bones of the limmes, which are legs and armes. The bones of the armes are either above the joynt of the ſhoulder, or under. Above the joynt lyeth the ſhoulder-blade. The ſubſtance of it is for the moſt part hard and ſolid; the outſide is ſomewhat arched, but the inſide hollow, it ſeemeth triangular. It is joyned to ſundry parts by *ſyſſarcoſis*, or concarnation, by meanes of the muſcles. It is joyned with the nowle bone by the cucullar muſcles; to the *vertebræ* of the necke by the ſecond paire of them; to the back by the muſcle *rhomboides*. The broad end is called *acromium*; the other end under this, narrow and thick, is called *cervix*. Here is the anchor-like proceſſe, which hindereth diſlocation that way: wherefore ſeldome is the *adjutorium* put out forward. In the inſide of this bone about the middle there is a hole, by the which a vein doth paſſe for nouriſhment of it. The ſhoulder-blade hath a threefold uſe. Firſt, it receiveth the *adjutorium*, and maeth the articulation called *arthrodia*. The cavity of the ſhoulder-blade which receiveth the *adjutorium* is ſhallow, that the arme might readily move every way. This hollowneſſe is recompenſed three manner of wayes; firſt, by a ſtrong ligament, which compaſſeth the joynt: Secondly, by the tendons of three muſcles, *ſupraſpinatus*, *infraſpinatus*, and *ſubſcapularis*, doing the ſame. Thirdly, by a cartilage which cleaveth orbicularly to the ligament, but not to the hollowneſſe. Secondly, ſundry muſcles ſpring from the ſhoulderblade. Thirdly, it defendeth the back from being hurt.

CAP. XVIII.

Of the Shoulder-bone.

NOw the bones of the Arme, under the joynt are three; the ſhoulderbone, the elbowbones, and the bones of the hand. The ſhoulderbone is of a hard and ſolid ſubſtance: it is hollow all alongſt like a whiſtle, wherein a marrowy ſubſtance is contained. At the two ends it is broad, but round in the middle. In the top of it there is a long chinke through which the nervous head of the *muſculus biceps* doth paſſe. In the lower end you ſhall obſerve the pulley, about the which the *ulna* is turned, which is in the inner knob; to the outer knob which is covered with a cartilage, the *radius* is joyned. At the ſides of theſe are two ſmall knobs, from whence muſcles ſpring. About the middle of this bone in the inſide, you may perceive a hole through the which a veſſell doth paſſe to the marrowy ſubſtance for nouriſhment.

CAP. XIX.

Of the Elbowbones.

THeſe are in number two; to wit, the leſſer above called *radius*, and the larger below called *ulna*. Their ſubſtance is firme and ſolid, if you except the additaments of them. Both of them are long, and containe a marrowy ſubſtance : they are ſomewhat rough, by reaſou of the lines appointed for the muſcles.

The *ulna* is large above, leſſer below : it ſerveth for the ſtretching out and bending of the arme, aud ſo it is articulate by *gynglymos*; but the *radius* is leſſer above, but longer below, to receive the bones of the wriſt : it is joyned by *arthrodia*, and ſerveth for the turning up and downe of the hand. The *radius* above is received by the *ulna*, but below the *ulna* is received by the *radius*. They are joyned together by a long ligament, which ſevereth the internall muſcles from the externall. The ſemicircular knob in the hinder part of the *ulna* is called by *Hippocrates ancon*, by *Galen olecranon*. Theſe two bones part about the middle ; partly that the *radius* might the more eaſily peforme its ſemicircular motion, partly to receive the muſcles.

CAP. XX.

Of the bones of the Hand.

THE hand is divided into three parts: the wriſt, called *carpus*; the diſtance betweene the wriſt and fingers, called *metacarpus*; and the row of fingers.

The bones of the wriſt are eight in number whereof there are two orders: the upper hath three bones ſo joyned together that they ſeeme one; the fourth is the leaſt of all, and placed under the little finger. The inferior hath foure bones; they are joyned together by *harmonia*, becauſe their motion is obſcure. The upper rank is joyned with the lower part of the *ulna* by *arthrodia diartbrodes*; but the lower with the *metacarpus*, by *arthrodia ſynartbrodes*.

One thing is to be noted, that the annular ligament doth compaſſe the wriſt, and comprehendeth the tendons, which paſſe through the cavity of the *carpus*.

Metacarpus hath foure bones; they are of a ſolid ſubſtance, hollow & round, bigger than thoſe of the fingers: that which anſwereth the pointing finger is biggeſt, and ſo ſtill the lowermoſt are leſſer. Between each two a diſtance is left for the *muſculi interoſſei* of the fingers. Above and beneath they have an appendix; by the upper they are joyned to the wriſt, by the lower to the fingers; the upper hath a cavity, but the lower a round long top, covered with a cartilage.

In the palme of the hand there is a tranſverſe ligament, the which doth tye the bones of the fingers to the *metacarpium*. The thumb hath no connexion with the bones of the *metacarpium*, Firſt, becauſe it is articulate with the wriſt by *diarthroſis arthrodialis*, and hath a manifeſt motion; but the bones of the *metacarpus* are joyned to the wriſt by *ſynarthroſis*, and have no manifeſt motion.

Secondly, becauſe the upper of the thumb is ſhorter than the bones of the *metacarpium*, and not anſwerable to them.

As for the fingers, each of them hath three bones, each of them anſwering a bone of the *metacarpus*, the thumb excepted; their upper additaments have ſinuoſities, but the lower knobs. Theſe bones are joyned by *gynglymus*, and ſo they onely ſtretch themſelves out, and pull themſelves in. As for their obliquation, it doth depend upon the *enarthroſis* of the firſt bone with the *metacarpus*. Beſides theſe bones in the inſide of the hand, ſome ſmall bones called from their figure *ſeſamoidea*, like the ſeeds of *ſeſamum*, or oylie pulſe, or Turky millet: they reſemble the knee-pan, and ſeeme to ſerve for the ſame uſe; for in ſtrong extenſions they ſtrengthen the tendons. In the ſecond joynt of the thumbe there are two. The ſecond and third joynt of the forefinger have each one, the reſt have two in the firſt joynt. In children they are of a cartilaginous ſubſtance.

CAP. XXI.

Of the Thigh-bone.

THE leg is divided into three parts, the thigh, the ſhank, and foot. The thigh hath but one bone: but of all others it is the biggeſt: the two ends of this are to be noted. In the upper part there is a round head; the ſlender part under it is called the neck; it is long and oblique; for if it were ſtraight it would cauſe haulting by preſſing down the groyne. A ſtrong ligament doth keepe in the head within the hollowneſſe of the *Iſchium.* If this ligament be relayed or torn, it cauſeth halting. From the neck ſpring two prominences: and becauſe the muſcles called *rotatores* are faſtened to them, they are called *trochanteres.* the hindermoſt is the leſſer trochanter; but the laterall or uppetmoſt the bigger. The lower end of the thigh-bone hath two flat and low prominences, leaving a cavity in the middle. which receiveth the *aphyſis* of the *tibia*. And againe theſe prominences are received by the cavites of the *tibia*, by a looſe *gynglymus*. The upper part of this articulation is called the knee, the hindermoſt the ham. Above the knee appeareth a bone, not joyned with any other bone, called the pan, or *patella* : it is ſomewhat round, about two inches broad, plaine without having many holes, but within bunched, covered with a cartilage. It is ſet before the thigh bone and the *tibia*, to ſtrength the articulation; for otherwiſe the thigh-bone would ſlip out forward in going down any hill. It cleaveth to the knee by the thick tendons of the ſecond, third, and fourth muſcles which extend the *tibia*, and paſſe by the knee to it, and are implanted into the fore knob of it Two ligaments faſten the articulation of the thigh-bone with the *tibia*: the one is circular compaſſing both, the other is long, placed betweene the two bones, reddiſh, by reaſon of the veines there. Behinde there are two ſeed bones, tyed to the two beginnings of the firſt muſcle which moveth the foot to ſtrengthen them. Great wounds of the ham are mortall, by reaſon of the great veſſels which paſſe that way.

Cap. XXII.

Of the two bones of the ſhank.

THE ſhank is compoſed of two bones. The greater focill is called *tibia*, the leſſer *fibula*. In the upper part it hath a proceſſe, which is received by the hollowneſſe of the thigh-bone. It hath alſo two long cavities for the receiving of the two prominences of the thigh-bone. To help the ſhallowneſſe of theſe cavities, there is joyned by ligaments a moveable cartilage, ſoft, ſlippery, and bedewed with an unctuous humour, which being thick, becommeth thinner towards the center: it is called *cartilago lunata*, the Moon-like cartilage. It is joyned to the thigh bone by *gynglymus*. The *fibula* onely cleaveth to the *tibia*, and toucheth not the thigh-bone. The *tibia* cauſeth the internall ankley. About the middle it hath a conſpicuous hole to let in a veine for nouriſhment. This bone is triangular, having three lines; the ſharpeſt before is called *ſpina*; of the poſterior the inward is blunt; but the outward ſomewhat ſharp. The *fibula* is a firme bone alſo, and as three ſquare likewiſe, one line is before, and two behinde; the upper end hath a hollowneſſe covered with a cartilage in the inner ſide, which receiveth the laterall knob which is under the appendix in the upper end of the *tibia*, the lower end maketh the outer ankle.

CAP. XXIII.

Of the bones of the Tarſus.

OF the foot as of the hands there are three parts, *tarſus*, *metatarſus*, and the toes. The *tarſus* is the diſtance betweene the lower end of the two focils, and the beginning of the five bones which are articulate with the toes: It hath ſeven bones; the firſt is *talus*, or the game bone; the great and ſmall focill are joyned with it, and ſo the foot is ſtretched out, and drawne in, as alſo moved to the other ſide; all beaſts with a cloven foot have this bone. In the upper part it is articulate with the *tibia* by *gynglymus*, and ſo below with the heel-bone. The ſecond is called *ciſos*, the heel-bone under the *talus*; this receiveth the great tendon called *nervus Hectorius*, compoſed of the tendons of thre muſcles of the ſhank. Above it receiveth the *talus*, below it is received by *os cubiforme*.

cubiforme. The third is called *naviculare*, from its figure; for it is long, without bunched but within hollow, being covered with a cartilage, where it receiveth the end *oſtalus*. The fourth is called *cuboides*: becauſe it hath ſixe ſides, repreſenting a *cubus*. In the forpart it is joyned to the fourth and fifth bone of the *metatarſus*; in the hinder with the heelebone; but in the inſide, it, with the reſt of the ſides are joyned with no bones, but are free. The three enſuing are called *cuneiformia*, or wedgelike bones; for above they are broad, but below they are narrow; being joyned, they repreſent a vault: for above they are arched, but under hollow, to receive the tendons and muſcles, and not to touch the ground, for that the *cuboides* onely doth. The firſt of thoſe bone is the greateſt, wedgelike ſeated in the inſide of the foot. The ſecond is the leaſt, placed in the middle. The third is that which is meane betweene both in bigneſſe. Theſe three are joyned with the bootlike bone, or *os naviculare.*

CAP. XXIV.

Of the reſt of the Bones of the Foot.

THe *Metatarſus*, or inſtep, hath five bones; for one is appointed for the ſtaying of the great toe, which is not in the hand.

They are ſolid without, hollow within, longer than the bones of the back of the hand. That which ſtayeth the thumb is thickeſt, the longeſt is that which ſtayeth the next toe: and although al the reſt of the toes are of an equall thickneſſe, yet the uppermoſt are longer than the lowermoſt: the lowermoſt parts are inſerted into the hollowneſſes of the firſt joynts of the toes; but the uppermoſt ends are received by the bones of the *tarſus*. That which ſtayeth the thumb is received by *cuneiforme majus*: the ſecond by *cuneiforme minus*: the third by the third wedgelike bone: the other two by the two tops of *os cubiforme.*

The bones of the toes are in number fourteen; for the great toe hath onely two, but the reſt three. Theſe bones are ſolid without, and hollow within; they have three joynts, and two proceſſes: the lowermoſt hath two knobs, received by the top of the lower, but the uppermoſt receiveth: the uppermoſt joynts have a deeper hollowneſſe, because they receive the ends of the bones of the inſtep. The ſeed-like bones are ſeated as they are in the hand, two are in the ſecond joynt of the thumbe, which ſtrengthen the tendo of the muſcle which bendeth it.

Cap. VXX.

Containing an Explication of ſome termes which are found in Anatomicall Authors in the Doctrine of Bones.

COtylæ are termed deepe cavities in the articulation of the bones.

Glenæ,

2 *Glene*, or *glenoides* are ſhallow cavities.

3 *Epithyſis*, or *appendix* is called a bone which groweth to the end of another bone. It is of a ſpongious ſubſtance, at the firſt griſtly, but afterward becommeth bony; it may be ſeen in both the focils of the legs at both the ends.

4 *Apophyſis*, or *tuberculum* is a part of a bone not added, but bunching out above the ſmooth ſuperficies, if it be ſharp, it is called *ſpina*.

5 *Condylus*, is a low prominence, and flat.

6 *Corone* is a ſharp prominence.

7 *Supercilia*, or *labra*, are the upper brimmes of the cavities of the joynts.

Cap. XXVI.

Of the number of the Bones.

IN Anciene times they were holden to be 246. according to this diſtich:

Adde quater denis bis centum ſenaque habebis.
Quam te multiplici condidit oſſe Deus?

But the diligence of late Anatomiſts hath fonnd out more. Thus then they may be ſummed:

The head hath	8
The upper *jaw*	11
The lower *jaw*	1
The teeth are 32. ſometimes	28
The *ſpina* hath	24
The *os ſacrum*	5
The ribs are	24
The breſt-bone 1, but compoſed of	3
The Cannel-bones	2
The ſhoulder blades	2
Of the *Iſchium*	3
In the armes	60
In the feet	64
The bones of the eares	6
The great ſeed-like bones of the great toes.	

If with ſome Anatomiſts you reckon 24 ſeed like ſmall bones in the two hands, and ſo many in the two feet, and two in each ham, and the eight bones in each hand, between the *carpus* and *metacarpium*, and the bony ſubſtance annexed to the *cuboides* in both the feet; in old perſons you ſhall have 54 mores which being joyned to 246, make up 302 expreſſed thus:

Ter centum & binis compactum eſt oſſibus iſtud,
Quod gerimus corpus: non eſt quod plura requiras.

If thou 302 bones chance to finde,
Few or none are left behinde.

CAP. XXVII.

Of a Cartilage.

A Cartilage is a ſimilary part, dry and hard, yet not ſo as a bone; flexible, which a bone is not; framed to ſtay the ſoft parts, and to repell the injuries of externall hard bodies. 1. Then it ſtayeth the ſoft parts. 2. It defendeth them. 3. They cover the ends of the bones, which have a looſe articulation 4. They knit bones together: as is ſeene in the ſharebone.

The differences are taken firſt, from the figure; ſo the cartilage of the breſtbone is called *enſiformis*, and thoſe of the *Larynx ſigmoides* like C. Secondly, ſome are ſolitary, not joyned with other bodies, as thoſe of the eares and eye-lids: ſome are ioyned, as moſt of the reſt. Thirdly, ſome ſtill continue cartilages, ſome degenerate into bones, as in women, the cartilages of the ribs, which lye under the breſts: for theſe growing very big, they become bony, the better to hold them up. They are in ſundry parts of the body. 1. In the head there are foure, to wit, of the eyelids, noſe, and eares; and the *trochlea* of the eye. 2. In the breſt there be three, to wit, the cartilages of the *larynx*: the ſmall pipes of the winde pipe, diſperſed through the lungs, and *cartilago enſiformis*. 3. The long ribs are joyned to the *ſternum* by cartilages. 4. The *vertebræ* of the back are joyned together by cartilages. Laſt of all ſundry are ſeen in the articulations, which are looſe, and in the conjunction of bones.

Cap. XXVIII.

Of a Ligament.

A Ligament is a ſimilary part without feeling, in ſubſtance meane, betweene a cartilage and a membrane, appointed firmely to knit the joynts.

Of the ligaments ſome are membranous (ſuch are thoſe which inviron the joynts;) ſome cartilaginous, as thoſe which are betweene the joynts, as is ſeene in the articulation of the thigh-bone with the *coxendex.*

Ligaments are to be found in divers parts of the body. Firſt, the bone of the tongue hath two ſtrong ligaments, one on each ſide. Beſides, on each ſide it hath round ones by the which it is tyed to the adjacent parts, to ſtay it in the middle of the mouth. Secondly, the tongue hath a ſtrong membranous ligament in the lower part about the middle of it. About the end of it the *frænum* is to be ſeen, which if it come to the fore-teeth, it hindereth the motion of the tongue and ſpeech. Children being ſo troubled, are ſaid to be tongue-tyed, and muſt have it cut. Thirdly, the ligaments which tye the *vertebræ* of the breſt and loynes, the ribs with the *vertebræ*, and the ribs with the breſt bone, are membranous. Fourthly, ſundry are to be ſeen in the belly. The firſt tyeth the *os ilium* to *os ſacrum*: the ſecond tyeth the *os ſacrum* to the *coxendix*: The third joyneth the ſhare-bones, and is cartilaginous. The fourth compaſſeth them circularly, and is membranous. The fifth compaſſeth the hole of *os pubis*, and is membranous. Fifthly, in the arme theſe appear. 1. Five tye the *adjutorium* to the ſhoulder-blade. 2. The bones of the elbow, *ulna* and *radius*, are tyed firſt one to another; ſecondly, to the ſhoulder bone; and thirdly to the wriſt, by membranous ligaments. 3. There are two annular ligaments, which being tranſverſe, direct the tendons which paſſe to the fingers,they are two; one in the outſide for the tendons of the extending muſcles; the other in the inner ſide, for the tendons of the contracting muſcles. 4. The bones of the wriſt, back of the hand, and fingers, have membranous ligaments. 5. In the leg theſe may be found out.

Firſt, the thigh bone is tyed to the *Coxendix*,by two ligaments.

Secondly, the lower end of it is tyed to *Tibia* and *Fibula* by ſix ligaments.

Thirdly, the *Tibia* is joyned to the *Fibula*, by a membranous ligament.

Fourthly, , *tibia* and *fibula* are joyned to the ankley by three ligaments.

Fifthly, the ankley is tyed with the bones of the foot by five ligaments.

Sixthly, the bones of the inſtep and toes are tyed with ſuch ligaments as thoſe are which are ſeen in the hand.

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